Crisis Mitigation and Recovery Division
Office of Sustainable Development
Bureau for Africa
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REPORT

MADAGASCAR LOCUST EMERGENCY

USAID ASSESSMENT TEAM
May 1 to 21, 1998

By

H D Swartzendruber
Team Leader

Noel Beninati, PhD
Crop Assessment Specialist

Alan Schroeder, PhD
Entomologist

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ACRONYMS

ADRA	Adventist Development and Relief Agency
AELGA	Africa Emergency Locust/Grasshopper Assistance
AFR	Africa Bureau (USAID/AFR)
ALS	African Locust System
BHR	Bureau of Humanitarian Response (USAID/BHR)
CIRAGRI	Ministry of Agriculture's groups of districts
CMR	Crisis Management and Recovery (USAID/AFR/SD/CMR)
CNLA	National Emergency Locust Team
CRS	Catholic Relief Services
EPA	Environmental Protection Agency
EU	European Union
FAO	Food and Agriculture Organization
FEWS	Famine Early Warning System
FEWS/W	Famine Early Warning System based in Washington D C
FFP	Food For Peace (USAID/BHR/FFP)
GIEWS	Global Information and Early Warning System
GIS	Global Information System
GOM	Government of Madagascar
GPS	Global Positioning System
GTZ	German Equivalent of USAID

IPM	Integrated Pest Management
MSU	Montana State University
OFDA	Office of Foreign Disaster Assistance (USAID/BHR/OFDA)
PVO	Private Voluntary Organization
PSC	Personal Services Contractor
SAP	Early Warning System funded by EU
SD	Sustainable Development Division (USAID/SD/CMR)
SOW	Scope of Work
TAM	Madagascar company that hires/leases aircraft
TDY	Temporary Duty
USAID	United States Agency for International Development
UNDP	UN Displaced Persons
USAID/W	United States Agency for International Development in Washington D C
USAID/M	United States Agency for International Development in Madagascar
ULV	Ultra-low Volume
VA	Vulnerability Assessment
VAM	Vulnerability Assessment Methods
VPI	Virginia Polytechnic Institute
WB	World Bank
WFP	World Food Program

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I INTRODUCTION

The Republic of Madagascar is an island off the coast of Africa in the Indian ocean A central mountainous plateau dominates the island which the highest point is Mount Maromokotro The capital city is Antananarivo Over twelve million people, comprising 18 ethnic groups, live in Madagascar Approximately 22% of the population live in the urban areas and 78% in rural areas Madagascar is one of the word's poorest countries and their economy is almost entirely based on agricultural even though only 5% of the land is farmed Madagascar is well known for its diverse biodiversity

On April 10 1998, the USAID Mission in Madagascar sent a cable (Appendix A) to USAID/Washington describing the current locust outbreak and requesting assistance According to the cable, some locust experts were predicting a crisis of "still-uncertain proportions arising from lack of timely response and poor on the ground logistic and managerial capacity " The cable went on to describe that "the area requiring pesticide treatment was estimated at seven million hectares (some 14 percent of Madagascar's land area) and that locust appeared to be multiplying at an unprecedented rate "

Based on the cable and further conversations with the USAID Mission, it was decided that USAID/Washington would send out a three person team The team consisted of a 1) Famine Early Warning System (FEWS) funded crop assessment specialist, who would assist USAID/M's Food Security Unit and other donors in obtaining a preliminary estimate of the harvest shortfall that could be expected and in suggesting future crop assessment methodologies, 2) an African Emergency Locust/Grasshopper Assistance Project (AELGA) entomologist to determine the extent of the locust infestation and examine the locust control operations in process or under study, and, 3) an emergency response specialist with strong ties to AID/OFDA as team leader and advisor on what emergency response would be appropriate, if needed

From May 4-20, 1998, the team conducted an assessment of the impacts of the 1997/98 locust outbreak in Madagascar The team's objectives were to

1 Assess whether and how best USAID/M can support locust control now,

2 Assess whether and how best USAID/M can support locust control over the next three to five years,

3 Assess the best crop loss methodology related to the locusts (and excess precipitation), to the extent possible perform maize loss assessment and determine food aid needs based on the 1997/98 agricultural season,

4 Assess the environmental impact and appropriate actions associated with the above suggested support (items 1-2),

5 Assess the public health impact and appropriate actions associated with the above suggested support (items 1-3), and

6 Assess the costs to be incurred by the above suggested support (items 1-5) and possible funding sources

The following report is based on the assessment conducted by the three person team During the team's in-country assessment, the crop loss specialist and entomologist participated on different rural assessments teams

II CROP LOSS ASSESSMENT AND MONITORING

A Mission Activities and Findings

Upon arrival in Madagascar, the USAID/M Food Security Unit arranged a meeting with the crop assessment mission participants A questionnaire had been prepared in advance and was reviewed, the objectives of the mission were discussed, and the sub-teams were formed Before proceeding on the mission, a visit was made to the national agricultural extension head office to gain a better understanding of the national network of field offices, and to attempt to arrange for the assistance of local agents during the assessment missions

May 9–12, Crop Assessment Mission

Participation of the crop assessment mission was extended to the sub-group by the members of an informal Food Prospects Committee This Committee is made up of donors, NGOs and government agencies that have been meeting in Madagascar since early 1998 The general approach was to do a rapid survey of the districts, that are considered important maize and rice growing areas, where the harvest was on-going, and for which crop data was difficult to obtain The choice of a rapid key informant methodology was based on the limited time available due to the urgent need in Antananarivo for an estimate of crop loss, and a manpower constraint for carrying out the survey Appendix B contains the general approach, the methodology, survey data, and the lessons learned from the Crop Loss Assessment and Appendix C contains the results from the Crop Loss Projection when data are limited

The three districts surveyed, Tsiroanomandidy, Miarinarivo, and Soavinandriana, see Appendix D, Map 1, District Numbers 111, 112, and 113, respectively These are in the high plateau west of Antananarivo The main cropping system in the area consists of the progressive sowing of rice during the rainy season on the slopes and bottoms of inland river valleys During the same period and starting with the onset of rains, upland rice and maize are sown on hill tops and slopes Other important crops included cassava, sweet potatoes, and beans Most farms also had a mixture of fruit crops, vegetable crops and small animals An especially productive and diverse agricultural area is found on the rich volcanic soils centered around Lake Itasy At the time of the assessment, there was a large amount of agricultural activity taking place as first season crops were being harvested and second season rice, bean, vegetable and other crops were being sown or cultivated At the same time, cereals, fruits and vegetables were being marketed

Most agricultural technicians interviewed, were well aware of, and concerned about, the locust attacks that had taken place in limited areas of the three districts Farmers interviewed were also aware of the reports of locust damage, but in most cases, had not been directly affected With the guidance of agricultural technicians, the team was able to reach two of the remote areas that had been invaded by locusts The details of the findings in the locust infested villages are presented in the section on crop loss projections, below The

Regional Crop Protection Service (DPV) head informed the team of a ground spray campaign that his office had carried out earlier in the year, but which had been suspended after the re-organization of the national anti-locust campaign He felt that the efforts of his technicians, along with the efforts of the farmers to spread powdered insecticide on their crops and scare locusts from their fields, had been effective

Based on field observations and conversations with farmers, technicians and cereals marketers, the general impression in the three districts visited had excellent harvest From the field visits to the two areas that were infested by locusts, it is clear that significant amounts of loss had occurred in individual fields and, in individual villages This was especially true in the village of Vohimarina (see below) where most of the village depended on one small valley bottom for its entire rice production Even in these villages however, the diversity of crops produced and the varying stages of crop development at the time of locust invasion (in these cases swarms came, fed over several days, and left) meant that total crop loss was not likely to reach even one quarter of production It must be emphasized, however, that this is an extremely small sampling of locust damaged fields, and that in other areas, at other times of the year, and where locust infestation was repeated or prolonged, crop loss could be significantly greater

Findings of the Four Survey Teams

Table 2 of Appendix B contains a summary of the most important data collected during the survey and additional information can be extracted from the survey results by the AID/Madagascar Food Security Unit and others as needed The conclusions are based on the parameters from the survey guides that gave the most consistent and reliable information

Rainfall In the areas studied, rainfall quantities were, in general, not a limiting factor to crop production this year There were, however, cases of excessive rainfall leading to flooding Results of interviews with 80 farmers in 15 districts indicate that 60% of the

Cereal Prices In 46% of the districts rice prices are currently lower than at the same time last year This is an indication that supplies are adequate in the market, and that farmers do not anticipate a supply shortage 31% of the districts reporting flooding or other damage, rice prices were higher than at the same time as last year Maize prices showed a similar tendency, with 50% of the districts having lower prices than at the same time last year and 20%, higher

Conclusions In general, it appears that rice and maize production supplies in the areas surveyed are at near average levels It appears from these farmer interviews that crop losses due to damage from locust was significant only in the district of Ambatofinandriana, though this result is not supported by the low cereal prices In most other districts where locust damage occurred, harvests did not seem to be significantly compromised, though it is clear that individual farmer and village losses are significant There appears from these results to be a clearer association between flood damage and crop loss, particularly in the rice crop, than there is between locust damage and crop loss

Crop Loss Projections Based on the field visit by the Crop Assessment Specialist to three mid-western districts, a rapid assessment methodology for estimating locust-related, district-specific crop loss was developed (Appendix C) The method requires district-specific data on crop production and area cropped (from historical records), as well as knowledge of the specific areas, crop growth stages, and timing of locust infestations (an actual sampling of fields for loss is much preferred)

Based on this information, assumptions are made at three levels—assumptions which can be easily manipulated to project different scenarios and to portray the situation for other crops and districts

1 Percentage of crop lost in a given village,
2 Percentage of villages attacked in a given district, and
3 Percentage of the total annual crop in the field and vulnerable at time of infestation

Extrapolation to the national level will not be accurate until information is collected and unique assumptions have been made for every crop, every month and every district (or at least every CIRAGRI—Ministry of Agriculture's groups of districts) However, as an example, applying the Crop Assessment Specialist's findings and assumptions for one district (see rice example, below) to all districts, a national monthly crop loss never exceeds 2% (35,000 MT) and 1 5% (3,000 MT) of the total national production of rice and maize, respectively

A Real Rice Loss Example from the District of Soavinandriana The Crop Assessment Specialist went with farmers, to their rice fields in the village of Vohimarina and made estimates of three factors (1) the percentage of total area cropped in rice that had been damaged by locusts, (2) the percentage of plants lost in different parts of the damaged fields, and (3) the resulting percent of normal production expected from the areas that had been

damaged From these values he calculated the actual rice production loss due to the late February locust infestation to be on the order of 15% of the village's annual rice production Using participatory appraisal and mapping techniques, he was able to determine that roughly one third (33%)of the villages in the Commune of Ambatoasana were infested Using information from local DPV and agriculture authorities, he estimated that four (33%) of the district's 12 communes had been infested by locust swarms (Map 2, Appendix D)

In order to be able to extrapolate the findings from this village across the district and for all months of the agricultural season, a third coefficient is needed as a rough indication of the percentage of the total annual crop that is in the field (and thus exposed to damage) in any given month Fifty percent of the crop is considered to be in the field during the first and last quarters of the agricultural season (the agricultural season is determined from published crop calendars that are specific to each CIRAGRI) and 100% of the crop is considered to be in the field during the two middle quarters of the agricultural season

For this example, annual rice tonnage normally produced in the District of Soavinandriana, X , would be multiplied by (15)(33)(33)(1) for the month of May which falls in the middle of the agricultural season, giving 016X , or a loss of 1 6% of the annual rice production for the district

B Recommendations for Further Crop Loss Assessments and Agricultural Season Monitoring

Current Crop Harvest Rational decision making of all types (e g development planning, food security analysis, economic monitoring, trade analysis), including weighing the pros and cons of expensive and potentially harmful locust control spray campaigns, should be made on the basis of a sound factual analysis The shortage of accurate baseline agricultural area and production data on which to base an economic analysis of locust damage is readily apparent Also missing is any systematic effort in the face of the current locust crisis to mobilize the necessary crop loss survey mechanisms, either in conjunction with the relatively well financed locust survey and control efforts, or through the EU funding to the governmental agricultural statistics structure

The FAO should be asked to supply the technical expertise to insure that not only a typical end of year harvest assessment is carried out, but also to assist the government Agricultural Statistics, Agricultural Extension, and Crop Protection Services to insure the collection of accurate locust damage and crop loss data resulting from the current outbreak As the dry season approaches, locust populations diminish, and harvesting of damaged fields is completed, the opportunity for this damage assessment will be lost

In addition, vulnerability monitoring (WFP, USAID/Madagascar Food Security Unit, and other donors to take the lead) is required to determine which districts, villages and groups might be least able to cope with crop losses resulting from pest infestations

Role of USAID/Madagascar's Food Security Unit USAID/Madagascar has the technical expertise in its Food Security Unit to contribute significantly to donor efforts that are underway to strengthen the national capacity to do agricultural season monitoring and vulnerability analysis USAID/Madagascar might wish to determine if the GOM would benefit from USAID/FEWS assistance in such areas as database support, technical backstopping, and networking support Such assistance could strengthen the ability of the AID/Madagascar Food Security Unit to obtain better food security analysis, and assist the Mission in response planning

A longer-term solution to the need for improved national-level agricultural season monitoring and vulnerability analysis requires a targeted effort and commitment on the part of the government and assistance from donors Elements of the national capacity required are being revitalized through EU funding to the National Agricultural Statistics Department, World Bank funding of the Agricultural Extension System, activities of a WFP VAM Unit, and through the activities of a SAP Unit operating in the south of the country

The USAID/Madagascar Food Security Unit currently contains the experience to be a major player in bringing donors and government together to improve early crop assessment and vulnerability analysis Under current time and budgetary constraints that role may have to be limited to that of catalyst and a resource for interested partners If Madagascar were to seek FEWS' assistance, USAID/Madagascar could take a more active role in supplying data and database support, climatological and crop-season related analyses, vulnerability analyses, training, and organizational and/or networking support to the national donor-assisted effort to build national capacity for food security analysis In the long run, this effort would allow a national food security unit to provide timely, accurate, and credible information to national and donor agency decision makers

NOTE The appendices referring to this section are to demonstrate the detailed versions which were left with the mission's Food Security Unit

III A LIMITED FIELD ASSESSMENT OF THE LOCUST SITUATION

A Introduction

Locust Background and Folklore

Locust populations have been surging and recessing for thousands of years in Madagascar and people who first settled this island have been evolving to deal with the locusts and their upsurges for more than 1,500 years (about 30 generations) This informs us that the problem is not new to the Malagasy, and the solutions, until this year, have never been too high-tech, nor too expensive The Malagasy means for coping with the locusts are well entrenched, so well entrenched and embedded within the culture that the language has more proverbs dealing with locusts than any other subject One of the more pertinent proverbs is translated as follows

"Locusts are there, and those who talk about them are skilled speakers "

This old proverb is about exaggeration It seems that some things never change

It is even normal in those years when unusually wet weather and other conditions permit the increase and enhanced movement of locust populations, to find the migratory locust swarms moving all the way north to the Mahajanga area So, the movement of the swarms this far north this year is not that unusual In addition, although some of the past locust outbreaks have lasted for several years, it should be remembered that the magnitude of those outbreaks never remained extremely high year after year, so the probability of this happening is quite low Poor weather conditions, which *are* established in Madagascar, can lead to the rapid decline in locust populations And, the annual dry season will lead to the further decline in locust swarm numbers and size, as the locusts search for, but in most cases do not find, the few suitable moist places to mate and lay eggs

Moreover, although the figures of Madagascar now invaded by locusts (four fifths of the country!) sound very high, we must remember that these figures represent only the extent of the range where locusts have been sighted, the entire four fifths area is *not* covered by locusts And it is not even likely that one millionth of this is actually covered by swarms and hopper bands Swarms extending for 5-10 kilometers sound and look impressive, but when taken on the scale of the surrounding thousands of kilometers of countryside not infested, the locust swarms are a minuscule aberration

Malagasy are practical people who catch and eat the protein and fat-rich locusts, grind and feed them to their pigs, plant rice at many different times so that potential losses due to locusts and other constraints are limited One coping mechanism of the Malagasy people is the burning of fires near their fields to produce noise and smoke to deter and burn locusts, plant back-up crops, and throw festive field parties to drive locusts from particularly susceptible crops

Information from local people Using FAO's Locust Guidelines on Survey, which state, on page 21, that "Swarms may be found as a rule by following up a report from local people", the team decided that farmer surveys would be the best way to ground truth outbreak information collected by other experts, as well address USAID's concerns in dealing with the outbreaks and their control The farmer is the basic unit in the information chain, has the greatest vested interest in crop production and protection, and is the one most impacted at the grass roots level by the decisions being made The team also had the privilege of working with Didier, an expert Malagasy linguist, translator and interpreter, fluent in all of the local dialects, and who greatly facilitated the questioning of farmers This unique element further strengthened our survey methodology, execution, and interpretation

Methodology The team chose two locations that were reported to have high concentrations of locust swarms, and where the control helicopters were currently based and spraying These two study site locations were Miandrivazo and Ihosy Ground truthing and information gathering exercises using farmer surveys were run at and around each of these locations, on two separate field surveys Data collection was systematic A list of initial and follow up questions was designed to address USAID's concerns are found in the appendices Systematic stops were made every 25 kilometers along the roads radiating out from the study sites, or at the next nearest farmer or village, if there was nothing at the 25 km point Additional spot surveys were conducted from Antananarivo to Antsirabe and from Ihosy to Tulear In Tulear, staff at the headquarters and command center for the Anti Locust Service were surveyed about the current campaign and their most pressing needs Below are the findings of the two surveys The surveys are found in Appendix E, and Appendix F contains the locations where the surveys were completed

B Findings

Survey I between Antsirabe and Miandrivazo, and to Antananarivo

The principle staple crops grown from Antsirabe to Miandrivazo were a mix of maize and rice, with rice becoming more dominant as we decreased in altitude Other crops especially grown in the highlands include potatoes, groundnut, and sweet potatoes Farmers at each location between Mandoto and Miandrivazo recounted stories of losses in some fields of rice and maize The estimations of these losses are best captured in our crop loss assessment If the losses sounded large (>50%), then a follow up question of "What will you do to get food and eat" was asked Cassava was the answer given in 82% of the surveys, and most of this was in the higher altitude areas before reaching Miandrivazo Cassava will be used both as a back-up food, and for sale to gain money with which to buy other foods

As we decreased in altitude toward and around Miandrivazo, the team found fields in many stages of rice maturation Farmers here have been spreading their risk of locust attack and other production constraints by planting rice at many different times in small

subdivided plots or fields, so that if one plot suffered some losses due to locust feeding, then the plot next to it was in a less susceptible stage, and either escaped damage altogether or suffered less damage Farmers near Miandrivazo stated that this was a very good cropping year In Kombiza Tsitesaraka, farmers said that they rely on some rice stocks from the past and will work, if need be, to earn money to buy food At several places along the road we could see two colors of rice drying, indicating that some of it was being harvested early Early harvesting serves as another mechanism to insure that some food is available and to get it out of the field before it can affected by locusts and other pests The village of Ankiranomena is a gold mining community, and farmers said that they can use their gold to buy food, if need be

Locusts On the trip from Antsirabe to Miandrivazo, only one large swarm and one large hopper band were encountered on or along the road between Mandoto and Miandrivazo The team saw some places along the road near Mandoto where farmers laid out small patches of captured dead adult locusts to dry And, small groups of settled locusts were encountered in rice fields around Minadrivazo With the above exceptions, the team drove through thousands of hectares of grass-covered hills on they way to, and in the river valley around Miandrivazo at the times of day when swarms are generally active and flying, and we saw no additional flying swarms

Farmer reports of locust swarm or hopper band sightings varied from none at Ambatolampy (the closest site to Antananarivo), to one recent small highly dispersed swarm in Ambatomainty Fihaonana, to two small dispersed swarms (one last fall and one recent one) in Tsaramody and Sambaina, to several since last fall as we approached Miandrivazo Farmers in Ankiranomena reported seeing locust swarms about ten times since last October Thus, there is a decrease in swarms as one goes north toward Antananarivo, and as one goes higher in altitude from Miandrivazo toward Antsirabe These farmer reports correlate with the current maps being produced on the spread of the outbreaks

Spraying The current spraying being undertaken by helicopters with fipronil is said to be for swarm reduction and not directly for crop protection

Farmers in all towns from Miandrivazo upland to Dabolav reported seeing the control helicopter at least once Farmers further inland and upland had not seen it Farmers in Miandrivazo pointed out parts of their fields where they said the helicopter sprayed Many of these areas included cropped rice, with small patches of grass and trees in between, so at least some of the spraying for swarm control was also serving as crop protection Farmers noted two types of spraying in their fields, spraying in well spaced parallel lines, and in square boxes (barriers) around hopper bands One farmer who heads a "canton" representing 500 farmers near Ambatomena said that there was a common complaint about the barrier spraying His constituents said that often the larvae would stay within the sprayed square and feed on much of what was there before ever moving over the barrier He also said that fixed wing aircraft have been used here in the past and

are preferred for aerial spraying because of their better coverage

Farmers surveyed said that pilots never come to the sprayed fields to check the efficacy of their spraying, but that in some cases near Miandrivazo, the ALS station staff do A few dead and dying locusts were found in a sprayed strip of field near Ambalamboro

Use of powder insecticides by farmers Farmers at all sites said that, in the past, they had been given limited quantities of powder insecticide for control of locusts in their fields Some farmers were given crank machines for powder application Others used their hands or an applicator bag that is hit with a stick to apply the powder All of the farmers interviewed felt that this powder was effective, and they were frustrated that they could not get sufficient quantities for better and more timely control

Farmers felt strongly that they were their own best resource for controlling locusts in their fields, and that they were ready to supply as much energy and free labor as was needed to protect their fields Some in Miandrivazo said "why pay thousands of dollars for helicopters when our labor is free " They prefer that the money be spent on purchasing and supplying powders and powder applicators for what they called "grass roots" control

Use of locusts for eating and for animal food Locusts provide an excellent source of protein and fats They are an important protein source for poor farmers and their families, who are often unable to purchase animal proteins All farmers interviewed said that they eat locusts when they can get them, and many grind them up to feed to their pigs All of the farmers interviewed said that they knew that they were not to eat sprayed or powdered locusts, however none of them (0%) were concerned about collecting insecticide-treated locusts to feed their pigs

Safety with pesticide use All farmers said that they were told to wash after applying pesticide powder, and not to eat locusts that had been treated with powder or sprayed by helicopters However, farmers in Ankiranomena asked about the safety of drinking water from, and grazing cattle in, areas that had been sprayed by the helicopter We told them to avoid these areas and carry drinking water from the village to the field

There was no evidence that fipronil liquid or any other pesticide was being taken from the 200 or 50 liter shipping barrels, subdivided into smaller containers, or being sold to farmers

Empty pesticide barrels One very reliable source in Miandrivazo told us that fipronil barrels are being brought to town and sold in quantity to people who are using them to store food and water

Alternative locust controls Farmers have many local non-pesticide means for controlling locusts, or reducing their impact Farmers burn fires near their fields to

produce smoke and noise to repel the adult locusts They also burn fires to drive larvae away from their fields and to burn them Many farmers also dig trenches and drive larvae into them for burying Near Miandrivazo, one farmer whose rice field had been attacked at a susceptible stage said that he brought his family, kids and others to the field to run around, shout and wave flags to chase locusts from the field, and it helped reduce damage

Additional observation Because many of the farmers surveyed said "thank you for coming to my field and talking to me," we assumed that others surveying for locust had not interviewed farmers These are farmers living right on the main routes that are easily accessible by motor vehicle So for the second survey near Ihosy, farmers were specifically asked if others had questioned them about the locust problem, and associated safety issues

Intensive aerial fipronil spraying by at least four helicopters was reported from Ihosy Farmers near Ihosy were also asked if any of the intensive spraying in or near their fields killed other wild animals We reasoned that farmers are the best observers of what is happening to the environment and wild animals near their fields

Survey II from Antananarivo to and around Ihosy to Tulear

The major crops grown for food and fed upon by locusts are rice and maize, with maize dominating in Sakaraha and Andranomaitso Maize losses in these two towns were especially high this year Alternate crops in most towns included cassava, groundnut, sweet potatoes, beans, some lentils, and cactus near Sakaraha Farmers also said that they have some left-over stocks of food grains, and have harvested early if they felt that the harvest was threatened Farmers in the towns of Andrera and Tritriva Vohibato told us of sugarcane leaves being eaten by locusts

Locusts Farmers in this southern region mentioned swarms of the red locust, which eats more than just graminaceous (grass-like) crops Some feeding damage on cassava and groundnut leaves was noted where the red locust occurred Farmers in the towns of Sakaraha and Andranomaitso felt that the current large locust outbreaks actually started in 1994, and not 1996, as stated on the first survey This concurs with the theory that the current outbreaks are a continuation of those from 1992/3 Farmers in Ambohimahasoa have seen locusts only twice, once last fall and once recently These sightings match those of other highland sites further north that were visited on survey I Farmers in Voatavo said that they see some small disperse swarms almost every year, but that the current ones are larger than normal People from Voatoavo to Ihosy and to Tulear had seen locust swarms several times since last fall

The team saw one large swarm near Ankaramena that flew past us for about 30 minutes On our first drive across Horombe Plateau on our way to Tulear, we saw three large swarms on the horizons, and drove through one that was partially settled and that had been sprayed Horombe Plateau covers hundreds of thousands of hectares (the locust swarms that we saw would cover only several hectares of this, if settled), and more than

99 99% of it had no flying swarms On our drive from Ihosy toward Ft Dauphin two days later, around the edge of Horombe Plateau, we saw no locust swarms, and only saw a few adults fly across the road

Spraying People in Ambohimahasoa had seen no spraying People near Ihosy had seen the spray helicopter go by at least once Those in Sakaraha and Andrera had seen fixed-wing aircraft spraying nearby last fall Anti-Locust Service staff had sprayed with back pack sprayers near Sakaraha and Andranomaitso Farmers in both towns would like to see the anti-locust effort involve their local communities

Use of powder insecticides by farmers The ALS center staff in Tulear stated that farmers in some areas were given powders, but were never given liquid pesticides Farmers at none of the sites except Tirtriva Vohibato had received, used, or seen powders being used, but would like to use these in community control efforts Farmers indicated that they have the energy and free labor to apply powder insecticides to locusts in their fields

Use of locusts for eating and for animal food All of the farmers interviewed said that they eat locusts Herders interviewed on the Horombe plateau commented that they had eaten so many locusts that they were now "drunk on locusts " None of the farmers mentioned the use of locusts for pig food In Sakaraha and Andranomaitso farmers said that raising pigs was not that common because they were only recently introduced

Safety with pesticide use Since very few of the farmers interviewed have been involved in the control campaigns, few had any knowledge of application safety All farmers were aware that they should not eat sprayed locusts, but were not informed about not grazing their cattle where aerial spraying had occurred Many of the farmers near Horombe Plateau are herders, and should be informed appropriately

The ALS pesticide storage shed in Ihosy was in reasonable order, however there were kids playing and farm animals next to it, close enough to smell the pesticide vapors People and animals should be kept further away from the shed

There was no evidence that fipronil liquid or any other pesticide was being subdivided into smaller containers, and sold to farmers

Empty pesticide barrels ALS employees in Tulear said that occasionally empty barrels are given to private individuals who provide the ALS with transport These individuals have said that they will use the empty barrels for fuel storage ALS employees said that the responsibility for how the barrels are used after that point lies with the individual accepting them No empty barrels were found at any of the survey sites

Alternative locust controls The alternative controls include all of the methods listed under the first survey, however fewer of the farmers indicated that fire was used as much Most said that running through the fields, shouting and chasing the locusts were the methods they use

Other animals killed by spraying In every instance but one, farmers said that they could remember no other animals except locusts being killed or dying due to any of the spraying, either by ground, fixed-wing aircraft, or helicopter The one exception was in Andranomaitso, where farmers said that ground spraying had been done nearby earlier this year by the ALS In this instance the farmers noted that "dangalia" lizards and "sangorokitaha" chameleons that had eaten sprayed locusts died Farmers in this village also noted that the black and white crows and another black and brown predatory bird ate the sprayed locusts with no noticeable illness or death

C Recommendations

With the following recommendations, the team will provide USAID Madagascar with ideas for immediate and longer term actions

Capacity strengthening (training) of farmers, ALS service ALS staff interviewed at the locust command headquarters in Tulear said that they need more staff, and that the staff need more training GTZ has provided most of the short term training for ALS staff in the past The MSU biocontrol initiative has done some specialized training in biological control research techniques, supported with part of the $2 5 million provided by USAID in 1992 Most of the rest of USAID's funds have gone for locust survey and control, pesticides, and FAO consultants None of it has specifically been earmarked for training

The team recommends that the donors and USAID/M assess the commitment and willingness of GOM to institute donor supported training activities FYI, the AELGA project has developed a three phase training the trainer program that has been successfully implemented in several locust-afflicted countries The first phase focuses on training between 30 and 40 crop protection staff (CPS) in all subjects of locust management, as well providing information and materials so participants can carry out training themselves The second phase focuses on the best 10 or so of this group who are used to train between 100 and 150 field development and extension officers at several sites around the country In phase 3, training is extended to about 200 lead contact farmers and nomads at several sites around the country

Reduced use of expensive helicopters for control, and more cost- effective aerial control using small airplanes USAID's Programmatic Environmental Assessment calls for the use of helicopters for carrying out locust surveys and for spraying in areas that are difficult or dangerous to spray by fixed wing aircraft USAID funds should be used for helicopter spraying only where the same cannot be accomplished by fixed-wing aircraft or ground control teams

Spray helicopters cost about five times more to operate and maintain than fixed-wing spray aircraft Many of the agricultural spray airplanes also have a much longer range than most spray helicopters, which gives them another advantage

The team believes that careful examination should be made of other options before scarce resources are used to fund helicopters for spraying Most of the current "swarm reduction" spraying is being done on the Horombe Plateau, which is extremely flat and not at all dangerous for spraying by airplanes There is also a good airstrip at Ihosy, from where most of the spray helicopters have been based and operating If there is a serious concern at the donor coordination level about additional and sufficient funds being made available for this campaign, then there should be more serious efforts to economize with what is available, instead of expending it on the most expensive, high-tech solutions possible

Other options should include the donor coordinating groups and fund providers quickly looking into the possibility of obtaining contracts from South African fixed-wing aerial spray companies, and providing basic or remedial agricultural spray training and certification for Malagasy pilots This can also be accomplished in South Africa Our team heard that the past local TAM fixed-wing spraying contract had a couple of pilots who were very effective at aerial spraying A small contract using these specific pilots can also be investigated

Any aircraft that are contracted should also be fitted with the GPS computers that record exactly where spraying has been done, the amounts and rate applied, and with warning signals when environmentally sensitive habitat is encountered This will help monitor the quality of spraying being done, will provide maps for environmental follow up and monitoring of sites that have been sprayed, and will warn pilots when they are too close to sensitive habitat and should cease spraying

Increased access to information, spray maps, amount pesticides During the team's assessment, was much confusion, and little useful information on exactly what was then being done with the pesticides and applications There were rumors that some of the ground and aerial spray equipment being used to apply ULV formulations of fipronil were not fitted for ULV application, so the pesticide was being applied at many times the recommended rates This is wasteful and dangerous for the environment and for human health Some of this is normal for an emergency campaign However, there needs to be a concerted effort by all of the donors contributing to this campaign to obtain regular updates on how much of each pesticide there is remaining at each location, how much has been sprayed, in what formulations, with what equipment, and where It was very difficult to obtain complete and accurate information from the responsible parties Most of the information is scattered and other issues are taking priority, so this type of reporting is not complete

All of the spray maps produced by the GPS spray monitoring computers in all of the spray helicopters and other aircraft need to be made widely available to the donor community so that more informed decisions can be taken, and pesticide use can be monitored At present, some or all of the maps were being sent to the responsible FAO consultant

Reduced and more efficient use of pesticides The current spray campaign to reduce swarms of locusts just before the dry season, when many of them will die out anyway, is of debatable value As far as larval band control when the next upsurges are expected in September/October, the FAO's Locust Guidelines on Survey state, on page 19, that "Searching a large area systematically for hopper bands is not practicable because they cover such a small fraction of the total area " So, even finding hopper bands to spray next fall is going to be highly problematic and likely to be patchy at best The challenge will be to locate the largest concentrations of hopper bands rapidly, so that time is not wasted spreading large quantities of pesticides on many small hopper bands

Better surveys, more accurate swarm and hopper band information Most of the likely fall breeding areas will need to be mapped and entered into a GIS database, and then rainfall and other weather data can be overlaid with this to predict areas of likely hopper band concentrations This, combined with local farmer reports, will be essential to making the campaign more efficient Most of the farmers encountered on our field surveys did not speak French, but instead used dialects of Malagasy When the helicopter surveys with expert consultants are done over the next few months and into the fall, they should be accompanied by a local person fluent in the Malagasy language and dialects, so that they can communicate effectively with the farmers, and translate for the foreign expert survey consultants

Some of the recent large-area surveys were being done with fixed-wing aircraft This type of survey is not recommended by the FAO, as stated in their locust guidelines on survey Survey is best carried out through questioning farmers And, if aerial survey is needed, then it should be carried out by the most cost effective means

Any information on the number of swarms present and the total area that they cover is highly speculative and open to debate

FAO's guidelines on survey during upsurges, outbreaks and plagues state, on page 19, that "In practice, it is not possible to carry out a statistically valid assessment for gregarising or gregarious infestations, so the estimates of the scale of the total infestation will be approximate " The current locust populations in Madagascar are gregarious infestations So, any population estimates provided by experts will, by the nature of this business, be highly speculative Different donors and groups with an interest in the locust problem need to provide separate assessments for some of the figures on population density of the locusts, and their potential to grow

Integrated approach to control, other pesticide choices It is not wise to rely on one control method or pesticide for the control of locusts Several pesticides need to be made available for the different environments where they will be used The World Bank team will be able to provide some good insight and options for which pesticides should be used, where and how

As far as USAID's environmental recommendations go, a list is provided in the appendix, taken from both the PEA and the 1998 Amendment to the Supplemental Environmental Assessment (SEA) of the Madagascar Locust and Grasshopper Control Program Options for including fipronil as an anti-locust insecticide (Appendix G), is provided for reference to the range of possibilities with pesticides currently permitted by USAID Amendment I and II to the SEA are all pertinent to Madagascar and need to be followed when using USAID funds Note a third amendment to the SEA has been drafted to look at fipronil as an anti-locust insecticide

All farmers interviewed in our field surveys want to use powder insecticides to control locusts in their crops As long as safety warnings are also provided, this method of crop protection should be encouraged Many of the farmers traditional means for controlling locusts and limiting damage need to be recognized and encouraged On a small scale, they seem to work well, and would likely not have continued to be developed and used if they did not work well

Biological control The biocontrol efforts being funded at present by several donors need to continue to be encouraged and supported There are currently three different groups working on developing biological agents such as fungi for the control of locusts and grasshoppers All three of the research initiatives have their individual strong points The oldest and most well established is the LUBILOSA initiative This group has moved biological controls to the mass production phase and is now looking for ways to commercialize production If their biocontrol fungi have been or can be tested and found to be effective against the Madagascar migratory and red locusts, and can be registered for use in Madagascar, then they should be encouraged to do so, and funded

The MSU initiative has been most active in Madagascar and is at the large scale field trial stage of testing prospective indigenous fungal strains GTZ has worked closely with the MSU project in Madagascar and should be able to provide some useful opinions on the direction the research might take and the amount of time still required to have a useful product in hand Our interview with GTZ indicates a relatively long period of time before this is likely to happen

The AELGA Project recently awarded a grant for continued biological control research, to Virginia Polytechnic Institute (VPI) and State University VPI will build upon the knowledge and technology base developed to this point

If USAID Madagascar is going to fund continued biological control research, it should explore means of using funding to leverage a cooperative effort among these different groups, if possible, and take advantage of the strengths of each The AELGA Project can be used as a source for background information and contacts, and should be consulted as this decision is being made by the mission

Environmental monitoring of any spray campaign The monitoring of the current spray campaign for environmental impact should be encouraged and supported as much as possible Most past locust spraying campaigns in Africa have encouraged this, but in the end have not funded it Madagascar's unique biodiversity demands that this be done and done well, with sufficient funds USAID Madagascar should support this initiative as much as possible When asked to comment on possible environmental concerns with fipronil applications at the May donor's meeting in Antananarivo, there was a statement by one of the FAO consultants that if the locusts are not controlled, they will cause environmental damage The migratory locusts only feed on grass species, and most of Madagascar is covered in grass If the locusts were going to cause environmental harm, they would have done it during the hundreds of thousands of years that they have been in Madagascar

Control of empty barrels As found in our field surveys, barrels are making their way into private hands, and in some cases are being used for storing food and water Some mechanism needs to be put into place to retrieve the barrels The team recommends that the barrels be destroyed (crushed and buried) so that they cannot be reused Other suggestions have surfaced during our survey, the most common one being the reuse of the barrels for storing diesel fuel In this case, there could be a contract to account for and collect all of the barrels, repaint them, clean them, fill them with diesel, and then sell them The one problem with this approach as brought out by the World Bank team logistician is that the barrels are very likely to be used for water or food storage somewhere down the line He has seen old fuel barrels being used for water storage in Madagascar, despite the taste likely imparted from the fuel to the water

Use of safety equipment and measures for pesticide application The team's survey showed that there have been warnings on eating sprayed locusts, but that no warnings have been given, or understood by farmers, about grazing cattle or drinking water where spraying has occurred, or collecting sprayed locusts for animal food Future warnings should also include these issues

The survey showed that farmers wish to use powder pesticides, and that they have been given warnings to wash well after handling these Many of the farmers had applied these powders by hand or with a bag and a stick Only some of them had been supplied with crank duster applicators, which are safer The purchase of additional crank dust applicators along with the powders should be supported These can be distributed to farmers by the ALS and then collected after the campaign is over

If USAID Madagascar is going to support the production and distribution of safety or health warnings to farmers coming into contact with insecticides either by application or by secondary exposure after they have been applied by others, then contact with the insecticide manufacturers will provide a starting point However, the mission should also collect information from the Environmental Protection Agency, because their concerns are likely to be different than those of the manufacturer And, the EPA's opinions and concerns will align with what is permissible and recommended in the United States

Improved pesticide storage area safety Most of the current pesticide being used in the aerial spray campaign was being stockpiled at a military warehouse near Antananarivo, and then transported to other locations This should help control the pesticide so that it is not stockpiled at less secure places The stockpiling of pesticides in quantities that are now present in Madagascar is not recommended by the team

If the weather during the dry season is not conducive to locust population increases, and the populations actually decrease, then there will be a large stockpile of pesticides left over This leftover pesticide can pose a costly disposal problem in the future, and could be misused for other pests

The pesticide storage shed near Ihosy, where children and farm animals were found right outside the building should be made more secure by putting fencing 5 meters around the it This will keep kids and animals further away from the pesticides and fumes emanating from the shed

Do not spray protected areas, parks, water resources, and use improved pesticide spray warning systems USAID's environmental regulations stipulate that pesticides not be applied near (at least 5 kilometers away from, if possible) any bodies of water or any sensitive habitats or parks Our team found that the spray helicopters may become equipped with monitors linked to their GPS computer spray systems that would produce an audible warning if such habitat was approached, so that the pilot could discontinue spraying We encourage this type of technology if the aerial campaign continues ALS ground spray teams also need to made aware of these environmental concerns

Public health monitoring of pesticide handlers and applicators There is a facility in Antananarivo that is capable of testing pesticide handlers and others for exposure to pesticides, so that they can be removed temporarily from the spray campaign and discontinue contact from the pesticides while their body detoxifies When our team was leaving Madagascar, we heard rumors of several pesticide poisoning cases in Fort Dauphin, due to people eating pesticide-killed shrimp The mission should try and monitor any cases like this and encourage that people who may have been exposed to pesticides be tested and medically treated

On the ground expertise In the past, the USAID/Madagascar mission had hired a person hired to work with the ALS in monitoring the locust situation The contractor was killed in a tragic accident and was not replaced It was an arrangement that many feel was important and it allowed USAID to stay ahead of the curve in anticipating any serious developments It is the recommendation of this team that this person be replaced ASAP This will enable USAID to keep an eye on the developing situation as we approach the next rainy season and locust breeding begins The person should be able to effectively monitor and deal with all of the issues listed in this report The AELGA project can help identify a person to do this, if requested

Working closely with regional groups and resources to involve them in the locust campaign in Madagascar Madagascar is close to two of the regional locust control groups in mainland Africa, the Desert Locust Control Organization (DLCO) for Eastern Africa, based in Addis Ababa, with a large office in Nairobi, and the International Red Locust Control Organization (IRLCO) for East and Southern Africa, based in Ndola, Zambia Both have highly trained locust control technicians, pilots, and aircraft for survey and control DLCO has at least three DeHavilland Beaver aircraft fitted for locust spraying, and IRLCO has two Cessna 185s and one Islander aircraft fitted for locust control, and one Bell Jetranger helicopter for survey

Either or both of these groups could be involved in the current campaign provided they are not involved in control campaigns in their mandated countries Their aircraft are much closer to Madagascar than the helicopters being freighted in from Europe, and can be flown there for a much lower cost These two groups should be encouraged to apply for contracts being offered for control services in Madagascar for the upcoming fall campaign All pilots are required to use English as the common international pilot language So, the French language requirement that had been placed in past contracts should be waived Arrangements should be made to include at least one bilingual person on each ground support team

IRLCO has stated in recent discussions that it has an interest in being involved in Madagascar, and the pilots stated that it is quite easy to get their aircraft to Madagascar, either by flying directly from the coast of Mozambique, or stopping over in Comores on the way DLCO has recently diversified the aircraft services it provides and is in a good position to help with the current campaign

In addition, the Government of Madagascar should be encouraged to become a member of IRLCO This would provide more immediate access to IRLCO's services

IV POTENTIAL FOOD AID NEEDS

A Introduction

To assess the potential need for food aid resulting from the locust infestation and to determine a possible delivery mechanisms, the Disaster Response Specialist held a number of meetings with private voluntary organizations/non-governmental organizations (PVOs/NGOs) and others which have a history of managing food programs in Madagascar

Madagascar has been a recipient of food aid since the early 1960s Currently there are four agencies working in Madagascar which have many years of experience in the management of food aid programs They are

World Food Program (WFP) WFP has been in Madagascar since 1964 Since its Madagascar debut, WFP has spent $72 5 million for 16 projects, two of which are still active Of this total, according to USAID/M, $48 2 million were spent on 16 development projects and $24 2 million were spent on nine emergency operations

The two current WFP programs consist of a School Feeding Program, working mainly in the south of the country and food-for-work activities in Antananarivo and Toliara

An official of WFP/M has said that WFP has the capacity to respond rapidly to emergencies, if need be WFP would work in partnership with the **CNS (Conseil National de Secours -*"National Disaster Management Unit"*)**

Adventist Relief and Development Agency (ADRA) ADRA has been approved for a Title II commodity monetization program During the next two fiscal years, (FY1998 and FY1999) ADRA will monetize 7,400 MT CDSO (Crude degummed soy bean oil) The oil will be imported into Madagascar and sold to Tiko, Madagascar's largest edible oil processor The proceeds of the sale, programmed at $4,646,614 will be divided between ADRA, CARE and CRS to support their several programs ADRA will operate as the lead agency handling the importation, sale and the disbursement of funds on behalf of all the partners

Catholic Relief Services (CRS) CRS has conducted food aid programs in Madagascar since the early 1960s Currently CRS is proposing a FY 1999 program which will include 2,040 MT of Corn Soy Blend (CSB), 330 MT Vegetable Oil, and 1,879 MT Soy Fortified Bulgar (SFB) for a supplementary feeding program for pregnant and lactating mothers During the next two years CRS will move from programming and distribution of its Title II commodities and will finance its programs from the ADRA monetization proceeds

CARE CARE, which entered Madagascar in 1992, has, at present, no Title II program in country It is supported by several different donors and it will, however, be a major recipient of the ADRA monetization proceeds in support of its several programs

USAID/Madagascar A *Food Security Strategy* has been developed by the mission's Food Security and Disaster Unit The document describing this strategy was issued in May, 1998 It is extensive and describes the strategy in great detail (50 Pages) The strategy is elaborated in seven chapters as follows

1 Parameters of the Food Security Strategy
2 Strategic Context
3 Food Availability Nature, Scope and USAID Efforts
4 Food Access Nature, Scope and USAID Efforts
5 Food Utilization Nature, Scope and USAID Efforts
6 Natural Disasters Nature, Scope and USAID Efforts
7 USAID Madagascar Food Security Strategy

B Findings

It is clear, based on the crop assessments discussed earlier, that there is not an imminent need for additional food aid beyond that which is already programmed for the regular programs This could, however, change depending upon a worsening of the locust problem The USAID mission has a highly qualified staff who has responsibility for monitoring food security in Madagascar and ensuring that any emergency food aid which might be required is consistent with the Mission's food security strategy This person has been monitoring the situation up to now as her time permits

As mentioned above, there are four organizations presently in Madagascar with long years of experience in food aid in emergency situations, WFP, ADRA, CARE, and CRS Should the need arise, the organizations are there to respond Whichever agencies would be asked to participate might require additional staff for the duration of the emergency program Globally they each have experienced staff which could be pressed into service on relatively short notice

C Recommendations

Given that it takes upwards of 90 days for the food pipeline to begin to flow, we recommend that the Food Security Unit of USAID/M be charged with the responsibility of monitoring the status of crop loss very closely, as described earlier in this report

If food aid is required, several scenarios are presented here for consideration

1 If crop losses are localized, leaving populations vulnerable, but national production is adequate, a) consider monetizing commodities (CARE suggests monetizing in South Africa) and use the proceeds to organize cash-for-work projects in the effected areas, or b) organize local food-for-work projects using commodities purchased in-country with monetization proceeds

2 If, however the country is suffering an overall food deficit, WFP should be asked to import the appropriate commodities in the necessary quantities WFP should function as the wholesaler by delivering commodities to regional warehouses From there they should be turned over to ADRA, CARE and CRS to organize and administer the distributions at the local level, a) Food-for-work may be considered as the simplest and the more traditional approach for localized relief projects Many public-works-type projects come to mind For example light road repairs, such as filling potholes, etc , or b) another approach, but somewhat more complex at the front end is to monetize the commodities which are lacking on the market, using the proceeds in cash-for-work projects in the effected areas The advantage of this approach is that the transport and logistics are handled by the market This approach frees WFP and the PVOs to concentrate on organizing and managing the projects It also tends to stabilize the market keeping it in business in spite of a bad year

A major advantage of using WFP in this manner is that it frees the mission and the PVOs from the tasks of preparing clearing and submitting AERs and the constraints and reporting required by USAID Handbook 9 WFP also generally has a more diverse food basket because of its wider donor base

The Food For Peace Office would be essential in providing the technical assistance necessary in selecting and designing an appropriate response, and to approve any USAID Title II Emergency Food Aid

V DONOR COORDINATION

As in all large-scale emergency actions donor coordination is important Not only does it help prevent duplication of efforts, but also improves on the use of donor resources When the donors and the host country's government can come to a general understanding of the problem and agree upon a common approach, the partners, in cooperation with the host government, can then divide up the responsibility of providing resources This makes for better use of dwindling resources and enhances the effectiveness of the response by providing a focus of activities In the interest of an effective response, donor biases must be set aside and agreement be reached on a common goal and a strategy for reaching that goal

One hopes that the presence of the USAID team, followed by the World Bank's Panel of Experts will have helped clarify the issues and provided parameters on what is required and the best approach to address the problem

In Madagascar, because of its history, France is naturally the dominant donor partner Other governments, as well as the US are in supporting roles, either bilaterally or through support of International Organizations, e g World Bank, FAO, WFP, etc Because of USAID's limited mission in Madagascar, the team had the sense that the Mission felt that they had little to offer The USAID Mission should be aware that it is not the amount that is brought to the table but the expertise and willingness to work with the GOM that counts USAID/M is a part of USAID, which in spite of dwindling resources, is still a major player in the international aid arena There are at least three pressure points at which USAID can influence matters in the present situation, i e Washington, Brussels and Rome When the mission has a valid position that is not being given serious consideration in Antananarivo, the matter should be brought to the attention to those in USAID/W who can direct pressure at the proper point

VI LIST OF APPENDICES

Appendix A Cable Request from USAID/Madagascar

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AMEMBASSY HARARE
AMEMBASSY ADDIS ABABA
AMEMBASSY ROME
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AMEMBASSY PORT LOUIS
USCINCPAC HONOLULU HI//J2/J41/J45/J51//
CDRUSARPAC FT SHAFTER HI//APOP IM/ODCSOPS//
DA WASHINGTON DC//DAMO SSM/DACS AP LN//

UNCLAS SECTION 01 OF 06 ANTANANARIVO 002057

STATE FOR AF/E AF/EPS (WOODS) AND EUR/WE
(AMBASSADOR DESIGNATE BARNES)
ALSO FOR USAID BHR/OFDA (O KEEFE) OFDA/PMP
(RMEYER) AFR/SD/PSGE (ATWOOD) G/ENV (MITCHELL)
BHR/FFP (NELSON) BHR/FFP/EV (PICARD/O CONNOR)
BHR/OFDA/DRD NINA MINKA AND JAMES JACKSON
AA/AFR/DRC (RIFFENBARK) AND AFR/EA (HANDLER)

NAIROBI FOR REDSO/ESA/RFFPO

HARARE FOR OFDA (LUKASAVICH)

ADDIS FOR REGIONAL ENVIRONMENTAL HUB (MCNEAL)

ROME FOR FODAG

GENEVA FOR RMA DHA AND AFRC

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TAGS SENV EAGR EAID MASS MARR MA
SUBJECT MADAGASCAR LOCUST THREAT RISING
DISASTER AND FOOD SECURITY WATCH GROUP UPDATE (NO

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(C) 97 ANTAN 06155 (D) 97 ANTAN 05901

1 (U) THIS IS AN ACTION CABLE SEE PARA 18 FOR ACTION

SUMMARY

2 THE CURRENT LOCUST SITUATION MAY BE MUCH WORSE THAN HAD BEEN EXPECTED SOME LOCUST EXPERTS ARE NOW PREDICTING A CRISIS OF STILL UNCERTAIN PROPORTIONS ARISING FROM LACK OF TIMELY RESPONSE AND POOR ON THE GROUND LOGISTIC AND MANAGERIAL CAPACITY THE AREA REQUIRING PESTICIDE TREATMENT IS NOW ESTIMATED AT SEVEN MILLION HECTARES (SOME 14 PERCENT OF MADAGASCAR S LAND AREA) LOCUSTS APPEAR TO BE MULTIPLYING AT AN UNPRECEDENTED RATE DUE TO LOGISTICAL AND MATERIEL CONSTRAINTS THE PACE OF THE ONGOING LOCUST CONTROL CAMPAIGN HAS SLOWED GENEROUS EUROPEAN UNION AND OTHER DONOR FUNDS PLEDGED AT THE END OF 1997 HAVE YET TO BE MADE AVAILABLE THERE ARE SERIOUS ENVIRONMENTAL CONCERNS REGARDING USE OF THE CURRENTLY DEPLOYED PESTICIDE ADONIS (FIPRONIL)

3 (U) CROP LOSS TO DATE IS MANAGEABLE BUT INCREASING LIKELIHOOD OF LOCUST INVASION OF MAJOR RICE PRODUCTION CENTERS RAISES THE RISK OF SIGNIFICANT FOOD SHORTFALLS USAID/MADAGASCAR IS CONSIDERING SEVERAL RESPONSES TO THIS INCREASING THREAT POSSIBLE SHORT TERM RESPONSES INCLUDE

ENCOURAGEMENT OF FAO/E U SUPPORTED EFFORTS TO PROTECT NORTHERN QUOTE RICE BOWL UNQUOTE REGIONS THROUGH BARRIER AND AERIAL SPRAYING

SUPPORT OF A JOINT DONOR CROP LOSS ASSESSMENT AND

SUPPORT FOR A CAMPAIGN OF HEALTH MESSAGES TO ASSURE KNOWLEDGE OF APPROPRIATE USE AND DANGERS OF ADONIS

POSSIBLE LONGER TERM RESPONSES INCLUDE SUPPORT OF ECOLOGICAL MONITORING OF PESTICIDE USE DEVELOPMENT AND EVENTUAL MARKETING OF BIO PATHOGENS AND THE STUDY OF SPECIES PROTECTION ALTERNATIVES

4 (U) IN ADDITION TO THESE MEASURES USAID/MADAGASCAR URGENTLY REQUESTS IMMEDIATE

ASSISTANCE (A 1 3 PERSON FRENCH SPEAKING TEAM) FROM THE AELGA PROGRAM TO HELP US DEFINE WHAT SPECIFIC ASPECTS IF ANY OF THE LOCUST CONTROL CAMPAIGN WE CAN AND SHOULD SUPPORT BOTH THIS YEAR AND OVER THE NEXT THREE YEARS USAID HAS PROVIDED VIA FAO USDOLS 250 000 IN FY97 AND TECHNICAL ASSISTANCE IN FY98 TO SUPPORT THE CAMPAIGN BUT HAS NOT BEEN INVOLVED IN

THE PURCHASE OF PESTICIDES END SUMMARY

BACKGROUND TO A POTENTIAL DISASTER

5 (U) IN 1992 USAID FINANCED EFFORTS TO STRENGTHEN PREVENTIVE LOCUST CONTROL WITHIN THE MINISTRY OF AGRICULTURE FOUR YEARS LATER (JANUARY 1996) FAO LOCUST SCIENTIST DR JEAN FRANCOIS DURANTON WARNED THAT ROUTINE CONTROL MEASURES HAD NOT BEEN IMPLEMENTED AND THAT MAJOR LOSSES WOULD OCCUR THROUGHOUT MADAGASCAR IF EFFECTIVE CONTROL MEASURES WERE NOT TAKEN BY OCTOBER 1996 FAO MADE ITS FIRST SPECIAL APPEAL FOR USDOLS 2 MILLION FOR LOCUST PROGRAM ASSISTANCE IN APRIL 1997 FOLLOWED BY A SECOND APPEAL FOR USDOLS 3 MILLION IN JULY 1997 EFFORTS THEREBY FINANCED WERE NOT UNDERTAKEN IN A TIMELY FASHION SO FAO ISSUED A THIRD APPEAL FOR AN ADDITIONAL USDOLS 12 5 MILLION IN JANUARY 1998 OF WHICH MORE THAN USDOLS FIVE MILLION HAS BEEN PLEDGED BY THE EUROPEAN UNION

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MUSHROOMING LOCUST NUMBERS AND WIDE DISPERSION

6 (U) LOCUST HOPPER BANDS AND SWARMS HAVE BEEN REPORTED ACROSS MADAGASCAR EXCEPT IN THE NORTHEAST LOCUST POPULATIONS ARE NORMALLY CONCENTRATED IN THE SOUTHERN THIRD OF THE COUNTRY BUT TWO SPECIES (LOCUSTA MIGRATORIA CAPITO AND NOMADACRIS SEPTEMFASCIATA) HAVE BEEN SIGHTED IN THE MIDWEST (WESTERN ANTANANARIVO AND NORTHERN MAHAJANGA PROVINCES) AS FAR NORTH AS MAHAJANGA AND BEALANANA CITIES ERRATIC AND UNUSUALLY HEAVY RAINFALL HAS FAVORED EXPONENTIAL LOCUST POPULATION GROWTH IN LATE MARCH 1998 SOME SEVEN MILLION HECTARES (14 PERCENT OF MADAGASCAR S LAND AREA) WERE REPORTED AS INFESTED AND NEEDING TREATMENT 45 OF THE 111 DISTRICTS (FIVONDRONANA) OF MADAGASCAR HAVE BEEN THREATENED

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A MILITARY LED INTERMINISTERIAL COMMITTEE TO HEAD THE CAMPAIGN

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7 (U) NORMALLY THE MINISTRY OF AGRICULTURE S CROP PROTECTION DEPARTMENT IS RESPONSIBLE FOR LOCUST CONTROL AS THE CURRENT LOCUST PROBLEM ESCALATED AND APPEARED TO HAVE GROWN BEYOND THE CROP PROTECTION SERVICE S CAPABILITY PRESIDENT RATSIRAKA DIRECTED THE CREATION OF A SPECIAL NATIONAL LOCUST CONTROL COMMITTEE (CNLA) ON JANUARY 27 1998 THE DECREE NAMES THE MINISTRY OF ARMED FORCES AS THE IMPLEMENTING AND RESPONSIBLE AGENCY EXISTING FAO TECHNICAL AND COORDINATION OFFICES ARE INTEGRATED WITHIN THE CNLA WHICH HAS ALSO COORDINATED EFFECTIVELY WITH THE LOCUST CAMPAIGN S PRINCIPAL DONOR THE EUROPEAN UNION CNLA DEVELOPED SOUND STRATEGIES BUT ITS CREATION COINCIDED WITH A DELAY

IN DELIVERIES OF MATERIEL AND THE CAMPAIGN HAS FALTERED

8 (U) ON APRIL 3 MINISTER OF ARMED FORCES LTG RANJEVA AND SENIOR CNLA MILITARY STAFF REVIEWED THE ANTI LOCUST CAMPAIGN WITH EMBASSY POLITICAL OFFICER LTG RANJEVA INDICATED THAT DELIVERIES OF INSECTICIDE ARE NOW ARRIVING AND THAT AERIAL SPRAYING PLATFORMS (FOUR HELICOPTERS) HAVE ARRIVED AND WILL SHORTLY BE FULLY DEPLOYED 800 MILITARY PERSONNEL HAVE BEEN ASSIGNED TO THE ANTI LOCUST CAMPAIGN SO FAR ONLY 100 OF THOSE PERSONNEL ARE ACTIVELY ENGAGED (PRIMARILY IN TRANSPORTATION AND SURVEILLANCE) SINCE THE FAO HAS PRIORITIZED AERIAL SPRAYING WHICH HAS REDUCED PERSONNEL REQUIREMENTS

9 (U) ON APRIL 7 AIDOFFS ATTENDED THE MONTHLY MEETING OF THE CNLA WITH THE DONOR COMMUNITY THE FAO E U FAO BAD IBRD FRENCH GTZ AND MAURITIUS WERE REPRESENTED GENERAL VICTOR RAMAHATRA HEAD OF THE CNLA SUMMARIZED THE SITUATION FRANKLY HE NOTED THAT WHILE SOME SEVEN MILLION HECTARES MAY NOW NEED TO BE TREATED AS OF MARCH 10 THE CNLA HAD TREATED ONLY 360 000 HECTARES BEFORE RUNNING OUT OF PESTICIDE HE CHARACTERIZED CONTROL EFFORTS SO FAR THIS SEASON AS INEFFECTIVE AND LARGELY FUTILE THIS WAS DUE IN HIS VIEW TO TWO MAIN PROBLEMS

A) CHRONIC DELAYS IN FUNDING AND SUPPLIES CAUSED LARGELY BY SLOW REACTION FROM DONORS AND THE NEED FOR EACH DONOR TO FOLLOW ITS OWN PROCEDURES AND

B) A LACK OF COORDINATION AND LEADERSHIP ON THE GROUND WHICH HAS DIMINISHED BOTH NATIONAL AND DONOR CONFIDENCE

GENERAL RAMAHATRA STATED THAT THE FOOD SECURITY PROBLEM MAY NOT BE DRASTIC THIS SEASON BUT WILL BE MAJOR NEXT YEAR IF OPERATIONS ARE NOT MORE EFFECTIVE

10 (U) THE E U REPRESENTATIVE CRITICIZED THE LACK OF DONOR SUPPORT FOR THE CAMPAIGN AND THE CONDITIONS SOME DONORS PUT ON THEIR AID SUCH AS NO PESTICIDES AND ENVIRONMENTAL CONCERNS HE STRESSED THE MAGNITUDE OF THE ECONOMIC IMPACT OF SUBSTANTIAL CROP LOSSES AND CRITICIZED THOSE WHO PREFER TO GIVE FOOD AID AFTER THE DAMAGE IS DONE

11 (U) THE FAO REPRESENTATIVE AGREED WITH BOTH ASSESSMENTS HE STRESSED THAT MORE DONOR AID IS NEEDED AND THAT ONLY AERIAL OPERATIONS HAVE ANY HOPE OF SUCCESS AT THIS POINT HE ALSO SUGGESTED THAT THE GOM MAKE ANOTHER APPEAL TO DONORS HE HAZARDED THAT USDOLS 20 MILLION WOULD BE NEEDED TO SUPPORT CONTROL EFFORTS OVER THE NEXT 3 YEARS FAO CONSULTANT DURANTON PROVIDED A TECHNICAL ASSESSMENT OF THE CURRENT INFESTATION SHOWING THE NORTHWARD MOVEMENT OF HOPPER BANDS HE STATED THAT SWARMS ARE NOW DEVELOPING IN THE SOUTH AND WILL DEVELOP IN THE NORTHWESTERN AREAS WITHIN A MONTH HE RECOMMENDED

THAT CONTROL EFFORTS FOCUS ON LIMITING PENETRATION OF SWARMS TOWARD MAJOR RICE BOWLS SUCH AS THE MAROVOAY PLAIN AND ON TRYING TO CONTROL HOPPERS WHEREVER PRACTICAL

12 (U) COMMENT ONE CLEAR LESSON OF THE MEETING IS THAT ALL THE MAJOR PLAYERS (THE CNLA THE FAO AND THE E U) ARE VERY MUCH AWARE THAT THE SITUATION IS REACHING CRISIS PROPORTIONS THE DIRE PICTURE PAINTED BY ALL SPEAKERS HOWEVER ELICITED LITTLE OVERT REACTION AMONG THE ASSEMBLED DONORS THE LEVEL OF ENTHUSIASM WITH WHICH THEY WILL REACT TO A FURTHER REQUEST FOR SUPPORT TO THE CNLA REMAINS PROBLEMATIC END COMMENT

POTENTIALLY ADVERSE ENVIRONMENTAL IMPACT

13 (U) THE FAO/E U PESTICIDE OF CHOICE FOR THIS CAMPAIGN IS A PESTICIDE BRAND NAMED ADONIS MANUFACTURED BY THE FRENCH FIRM RHONE POULENC THE ACTIVE AGENT IN ADONIS IS FIPRONIL ADONIS WAS APPROVED FOR USE IN MADAGASCAR IN 1996 AND IN ITS ULTRA LOW VOLUME FORMULATION HAS ALREADY BEEN USED FOR THE CURRENT CAMPAIGN NOTABLY IN ANTSIRABE SINCE AUGUST 1997 FIELD AGENTS GENERALLY CONSIDER IT VERY EFFECTIVE

14 (U) ADONIS HOWEVER IS A BROAD SPECTRUM PESTICIDE AND RESIDUES REMAIN POTENT UP TO ONE YEAR THE GROUND SPRAYING CAMPAIGN USES A BARRIER SYSTEM IN WHICH 100M STRIPS PARALLEL TO LOCUST MOVEMENT ARE SPRAYED WITH UNSPRAYED 200M BETWEEN THEM TWO BRITISH EXPERTS EVALUATED THIS SYSTEM IN FEBRUARY AND CONCURRED THAT IT WILL LIMIT ENVIRONMENTAL DAMAGE NONETHELESS CONCERN IN THE ENVIRONMENTAL COMMUNITY REMAINS IMPORTANT GIVEN MADAGASCAR S EXTRAORDINARILY DIVERSE ENDEMIC FLORA AND FAUNA THERE ARE ALSO CONCERNS THAT ADONIS SHIPPING CONTAINERS AND SPRAYING MATERIEL MAY BE MISUSED BY UNINFORMED LOCAL POPULATIONS LEADING TO TOXIC EFFECTS IN THE HUMAN POPULATION (FOR EXAMPLE ON MARCH 27 USAID OFFICERS OBSERVED LOCAL RESIDENTS IN MIANDRIVAZO SELLING DRINKING WATER FROM A USED ADONIS BARREL) GIVEN THE URGENCY OF THE PRESENT SITUATION REGIONAL AUTHORITIES AND FIELD WORKERS REGARD THE TOXICITY OF ADONIS AS AMONG THE LEAST OF THEIR WORRIES

15 (U) THE USE OF ADONIS AND AERIAL SPRAYING AS THE PRIMARY ANTI LOCUST ACTIVITY HAS A SOCIAL COST IN THAT THE MOST AFFECTED LOCAL FARMERS HAVE NO MEANS TO DIRECTLY ADDRESS LOCAL INFESTATIONS AND PROTECT THEIR INDIVIDUAL FIELDS TO ADDRESS THIS PROBLEM LTG RANJEVA WILL ALSO PROPOSE A JOINT USDOD MALAGASY ARMY EFFORT ON A TARGETED RICE BOWL REGION USING MANUAL SPRAYERS AND LESS TOXIC POWDER INSECTICIDE

THIS PROPOSAL WILL BE TRANSMITTED TO USCINCPAC ASAP

RISKS TO MAJOR RICE PRODUCTION REGIONS

16 (U) MULTIPLE SOURCES CONFIRM THAT ONLY MINIMAL LOCUST RELATED CROP LOSS (PRIMARILY CORN) HAS SO FAR OCCURRED IN THE SOUTHERN PROVINCE OF TOLIARA (TULEAR) WHERE LOCUST SWARMS ORIGINATE HOWEVER THE TWO MAJOR RICE PRODUCING REGIONS WHOSE SURPLUS FEEDS MADAGASCAR S CITIES ARE MAROVOAY AND ALAOTRA NORTH OF ANTANANARIVO LOCUSTS WERE REPORTEDLY SIGHTED IN THE MAROVOAY PLAINS IN MARCH CONTROL EFFORTS HAVE YET TO BE IMPLEMENTED SO FAR NORTH ONE LOCUST EXPERT FAO CONSULTANT JEAN FRANCOIS DURANTON BELIEVES THAT THERE IS A VERY HIGH CHANCE THAT THESE RICE BOWL REGIONS WILL BE DECIMATED BY LOCUSTS BEFORE THE CURREN T RICE CROP IS HARVESTED URBAN RICE SUPPLIES MAY BE AFFECTED IF THIS OCCURS

CURRENT U S MISSION RESPONSE PLANNING

17 (U) GIVEN THE ADVANCED STAGE OF NORTHWARD LOCUST MIGRATION AND THE IMPORTANT POSSIBILITY OF SIGNIFICANT CROP LOSSES THIS YEAR THE U S MISSION TO MADAGASCAR IS PRESENTLY CONSIDERING FOUR RESPONSE OPTIONS THE FIRST THREE OF THESE ARE SHORT TERM

ENCOURAGEMENT OF FAO/E U SUPPORTED EFFORTS TO PROTECT NORTHERN RICE BOWL REGIONS THROUGH BARRIER AND AERIAL SPRAYING

SUPPORT OF A JOINT DONOR CROP LOSS ASSESSMENT A WFP/FAO MISSION IS SCHEDULED FOR MID APRIL TO HELP GUIDE THE STUDY THE APPRAISAL WILL ALSO DRAW ON LOCAL STAFF OF THE GERMAN GTZ TO ASSESS POTENTIAL FOOD DEFICITS AND TARGET RELIEF ACTIONS

SUPPORT A CAMPAIGN OF HEALTH MESSAGES TO ASSURE KNOWLEDGE OF APPROPRIATE USE AND DANGERS OF ADONIS THROUGHOUT LOCUST CONTROL ACTION ZONES USAID/MADAGASCAR WILL CONTACT MANUFACTURER RHONE POULENC FOR EXISTING WARNING AND UTILIZATION MATERIALS THE FOURTH AIMS TO ADDRESS THE BROADER ISSUE OF LONG TERM ENVIRONMENTALLY SENSITIVE LOCUST CONTROL

WORK WITH OTHER DONORS IN THE ENVIRONMENT SECTOR (INCLUDING WORLD BANK AND UNDP) ON THREE AXES SUPPORT OF ECOLOGICAL MONITORING OF PESTICIDE USE DEVELOPMENT TESTING AND LOCAL PRODUCTION AND MARKETING OF BIO PATHOGENS FOR FUTURE LOCUST CONTROL AND STUDY SPECIES PROTECTION ALTERNATIVES

ACTION REQUEST FOR AA/AFR/DRC

18 (U) TO HELP US PLAN A MORE EFFECTIVE RESPONSE TO THIS UNFOLDING EMERGENCY HOWEVER

USAID/MADAGASCAR URGENTLY REQUESTS IMMEDIATE ASSISTANCE FROM THE AFRICAN EMERGENCY LOCUST AND GRASSHOPPER (AELGA) PROGRAM WE NEED A SMALL TEAM (1 3 PERSONS) OF FRENCH SPEAKING AGRICULTURE/PEST CONTROL SPECIALISTS TO ASSIST US IN DEFINING WHAT SPECIFIC ASPECTS IF ANY OF THE LOCUST CONTROL CAMPAIGN USAID CAN AND SHOULD SUPPORT BOTH THIS YEAR AND OVER THE NEXT THREE YEARS AN IMPORTANT ASPECT OF THIS AELGA ASSISTANCE WOULD BE AN ASSESSMENT OF PROBABLE COSTS AND POSSIBLE FUNDING SOURCES (NOTE THAT AT PRESENT USAID/MADAGASCAR HAS VIRTUALLY NO BILATERAL RESOURCES AVAILABLE FOR LOCUST CONTROL) THIS VISIT WOULD HELP THE U S MISSION THE CNLA AND OTHER DONORS PREPARE FOR A NEW AND HOPEFULLY MORE DECISIVE AND SUCCESSFUL ANTI LOCUST CAMPAIGN TO BEGIN IN OCTOBER 1998 (MADAGASCAR S AUSTRAL LATE SPRING AND SUMMER OCTOBER THROUGH FEBRUARY IS THE SEASON OF GREATEST LOCUST VULNERABILITY TO CONTROL EFFORTS) THIS AELGA TEAM WOULD ALSO COMPLEMENT THE WORK OF USAID FUNDED FAO CONSULTANT ANNIE MONARD WHO ARRIVED APRIL 6 TO ASSESS AND HELP CONFRONT LOGISTICAL CHALLENGES PLAGUING THE CNLA AS WELL AS THAT OF AELGA PROGRAM STAFFER ALAN SCHROEDER WHO IS SCHEDULED TO MAKE A BRIEF VISIT IN APRIL/MAY TO ASSESS THE CURRENT SITUATION

COMMENT

19 (U) IT APPEARS THAT ADMINISTRATIVE DELAY LOGISTICAL SHORTCOMINGS AND UNUSUAL EL NINO RELATED

WEATHER HAVE CONSPIRED TO PUSH THE LOCUST PROBLEM TOWARD A FULL FLEDGED CRISIS AT THIS POINT THE MAJOR POTENTIAL THREAT IS THE IMPACT LOCUSTS MAY HAVE ON FOOD SUPPLIES DESTINED FOR URBAN CONSUMERS WE EXPECT SOON TO BE ABLE TO QUANTIFY THE LIKELY EFFECT ON THIS YEAR S HARVESTS AT THIS POINT WE DO NOT WISH TO BE ALARMIST BUT WE ALSO DO NOT WANT THE U S FOREIGN ASSISTANCE COMMUNITY TO BE CAUGHT UNAWARE IF THE DIRE PREDICTIONS NOW CIRCULATING FROM CREDIBLE SOURCES PROVE TRUE IF THE SITUATION BECOMES AS BAD AS THE FAO THE E U AND THE CNLA NOW PREDICT IT MIGHT ALL THE DEVELOPMENTAL RESULTS THAT USAID AND OTHER DONORS EXPECT TO ACHIEVE OVER THE NEXT SEVERAL YEARS WOULD BE CALLED INTO QUESTION WHILE THE U S MILITARY MAY BECOME INVOLVED IN SOME CONTROL EFFORTS (SEE PARA 15 ABOVE) WE DO NOT EXPECT THEM TO TAKE A LEAD ROLE IN THE OVERALL CAMPAIGN RATHER THE PROBLEM IS SQUARELY IN THE HANDS OF THE GOM AND THE DONOR COMMUNITY USAID/MADAGASCAR NEEDS ASSISTANCE FROM AELGA NOW TO HELP CONCEPTUALIZE AND CARRY OUT AN APPROPRIATE ROLE WITHIN THE FRAMEWORK OF THE OVERALL DONOR RESPONSE TO THIS PROBLEM
POE

UNCLASSIFIED

NNNN

Appendix B Background, Methodology, Survey Data, and Lessons Learned

A Background

In response to an alarming locust outbreak throughout Madagascar during the 1997/98 crop season USAID/Madagascar (USAID/M) requested USAID/Washington (AID/W) to send a team to assist in determining if assistance from the US government would be required and what that assistance should be The USAID Famine Early Warning System (FEWS) was asked to provide a crop assessment specialist to assist USAID/M's Food Security Unit and other donors in obtaining a preliminary estimate of the expected national 1997/98 harvest, and to suggest future crop assessment and monitoring activities

The specific objectives laid out in the crop loss specialist's scope of work (SOW) were to

1 Conduct a Preliminary 1998 Crop Loss Assessment Survey in areas where significant portions of the national maize and rice harvests were underway or had been completed
2 Estimate the effect of harvest losses on national and regional food deficits
3 Assist in determining areas that are likely to be vulnerable to food insecurity based on maize and rice losses during this year
4 Assist in the development of crop loss assessment methodologies for the current season and in the future
5 Suggest ways in which the Mission can prepare to deal with future potential food security crises in Madagascar

After arrival in-country the priorities for the crop loss specialist's mission were modified by the USAID/M Director who asked him to assist the USAID/M Food Security Unit in preparing for a World Bank (WB) Expert Panel that was to arrive in Madagascar around May 17 In addition to carrying out the planned crop assessment mission, this involved serving as a member of the Economic Impact fact finding committee of the WB coordinated joint Donor/Government of Madagascar (GOM) Locust Emergency Task Force The teams SOW was further modified to "contributing to the development of a national locust control strategy, and helping define AID's optimal contribution to this effort and options for financial support for the effort " The team was asked to extend their stay in-country to be available to meet with the World Bank Expert Panel

These new activities took a large proportion of the Crop Assessment Specialist time and replaced objective 3, conducting a vulnerability assessment (VA) Limited base data, time, number of survey participants, and geographic scope of the survey did not allow for a VA The most Vulnerable area of the country is monitored by a donor funded Early Warning System (SAP) and was excluded from the crop loss survey

A meeting of crop assessment mission participants was arranged by the AID/Madagascar Food Security Unit The questionnaire that had been prepared in advance was reviewed, the objectives of the mission were discussed, and the teams were formed

Refinements were made to the interview guides (This appendix, Attachments 1-3) and two more meetings were held with the field teams to go over the methodology and determine the districts to be covered (This Appendix, Table 1) Before proceeding on the mission, a visit was made to the national agricultural extension head office to gain a better understanding of the national network of field offices, and to attempt to arrange for the assistance of local agents during the assessment missions

May 9-12, Crop Assessment Mission[1]

A sub-group of the members of an informal Food Prospects committee of donors, NGO's and government agencies, that had been meeting in Madagascar since early 1998, volunteered to participate in the crop assessment mission The general approach (the details of which are presented in this Appendix) was to do a rapid survey of those Districts that were important maize and rice growing areas, where the harvest was on-going, and for which crop data was difficult to obtain The choice of a rapid key informant methodology was based on the limited time available due to the urgent need in Antananarivo for some sort of estimate of crop loss, and a manpower constraint for carrying out the survey

General Observations of the Crop Assessment Specialist

The three districts surveyed by Monique See of the AID/Madagascar Food Security Unit and the Crop Assessment Specialist, Soavinandriana, Tsiroanomandidy, and Miarinarivo (Maps 1 and 2 of Appendix D) are in the high plateau west of Antananarivo The main cropping system in the area consists of the progressive sowing of rice during the rainy season on the slopes and bottoms of inland river valleys During the same period and starting with the onset of rains, upland rice and maize are sown on hill tops and slopes Other important crops included cassava, sweet potatoes, and beans Most farms also had a mixture of fruit crops, vegetable crops and small animals An especially productive and diverse agricultural area is found on the rich volcanic soils centered around Lake Itasy At the time of our visit, there was a large amount of agricultural activity taking place as first season crops were being harvested and second season rice, bean, vegetable and other crops were being sown or cultivated At the same time cereals, fruits and vegetables were being marketed

Most agricultural technicians interviewed, were well aware of, and concerned about, the locust attacks that had taken place in limited areas of the three districts Farmers interviewed were also aware of the reports of locust damage, but in most cases, had not been directly affected With the guidance of agricultural technicians we were able to reach two of the remote areas that had been invaded by locusts The details of the findings in the

[1] Specifics of the methodology, findings, and lessons learned are presented in Appendix B

locust infested villages are presented in the section on crop loss projections, below The Regional Crop Protection Service (DPV) head informed us of a ground spray campaign that his office had carried out earlier in the year, but which had been suspended after the re-organization of the national anti-locust campaign He felt that the efforts of his technicians, along with the efforts of the farmers to spread powdered insecticide on their crops and scare locusts from their fields, had been effective

Based on observations of crop fields and conversations with farmers, technicians and cereals marketers, the general impression in the three districts visited is that most farmers had an excellent harvest From the field visits to the two areas that were infested by locusts, it is clear that significant amounts of loss had occurred in individual fields and, in individual villages This was especially true in the village of Vohimarina (see below) where most of the village depended on one small valley bottom for it's entire rice production Even in these villages however, the diversity of crops produced and the varying stages of crop development at the time of locust invasion (in these cases swarms came, fed over several days, and left) meant that total crop loss was not likely to reach even one quarter of production It must be emphasized, however, that this is an extremely small sampling of locust damaged fields, and that in other areas, at other times of the year, and where locust infestation was repeated or prolonged, crop loss could be significantly greater

Findings of the Four Survey Teams

Table 2 of this appendix contains a summary of the most important data[2] collected during the survey The conclusions are based on the parameters from the survey guides that gave the most consistent and reliable information

[2] Additional information can be extracted from the survey results by the AID/Madagascar Food Security Unit, as needed

Outil 1 : GUIDE POUR LES MAIRES-PREFETS-AGENTS AGRI.

L'EVALUATION DE LA CAMPAGNE AGRICOLE 1997/98

I - IDENTIFICATION

I-1 – Faritany
I-2 – Region
I-3 – Fivondronana
I-4 – Commune

I-5 Date de l'enquête |__|__|__|__|__|__|
I-6 Nom/Fonction de la personne enquêtee

II – POPULATION (*)

Population totale de la commune |__|__|__|__|__|

III - PLUVIOMETRIES

III-1 - La pluviometrie, par rapport a une annee normale, a ete
- plus abondante |__| - normale |__| - moins abondante |__|

III-2 – Elle a ete, par rapport a une annee normale
- mieux repartie |__| - moins bien repartie |__|

IV – DONNEES

IV 1 – sur les cultures

Cultures	Superficies (Ha)	Par rapport a l'annee precedente
Riz	|__|__|__|__|__|	Plus meme moins
Mais	|__|__|__|__|__|	Plus meme moins
Manioc	|__|__|__|__|__|	Plus meme moins
Patate Douce	|__|__|__|__|__|	Plus meme moins
Paturage	|__|__|__|__|__|	Plus meme moins
Autres	|__|__|__|__|__| |__|__|__|__|__| |__|__|__|__|__|	Plus meme moins Plus meme moins Plus meme moins

IV 2 – Sur l'elevage

Animaux	Quantite l annee passee	Quantite cette Annee
Bocufs		

(*) = Optionnel

V – APPRECIATION DE LA CAMPAGNE

Comment voyez-vous la **campagne en cours**?

par rapport a la campagne precedente	**par rapport a une bonnee annee**	**par rapport a une mauvaise annee**
Mieux ☐	Mieux ☐	Mieux ☐
Aussi bon ☐	Aussi bon ☐	Aussi bon ☐
Pire ☐	Pire ☐	Pire ☐
Beaucoup pire ☐	Beaucoup pire ☐	Beaucoup pire ☐
Precision		

VI – DEGATS SUR LES CULTURES

Cultures	Causes	Degats estimes (%)
Riz		
Mais		
Manioc		
Patate Douce		
Paturage		
Autres		

SI ILS MENTIONNENT -EUX MEME- les criquets, posez lui le suivant
Decrivez les criquets que vous avez vu (larves, essaims, etc)?

_____

_____

Comparer ca avec des criquets vu avant (si jamais)

_____

_____

Appendix B

VII – BILAN PAR PRODUIT

Cultures	Estimation Stock actuel (T) dans les communautaires	Estimation Recoltes possibles (T)	Prix au marche actuellement	Prix au marche L an dernier
Riz	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|
Mais	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|
Manioc	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|
Patate	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|	|_|_|_|_|_|
Autres	|_|_|_|_| |_|_|_|_|	|_|_|_|_| |_|_|_|_|	|_|_|_|_| |_|_|_|_|	|_|_|_|_| |_|_|_|_|

En general, est-ce que les greniers des paysan sont PLUS MEME MOINS que la normale ? (cerclez une reponse)

VII-2 – Si la recolte est mauvaise, que fait la population ?

VIII – Passez 15 minutes a noter tous vos impressionici

Outil 2 GUIDE PAYSAN

POUR L EVALUATION DE LA CAMPAGNE AGRICOLE 1997/98

I – IDENTIFICATION

- Nom du District / Fivondronana
- Nom du village

II - PLUVIOMETRIES

II-1 - La pluviometrie, par rapport a une annee normale, a ete
- plus abondante |__| - normale |__| - moins abondante |__|

II-2 – Elle a ete, par rapport a une annee normale
- mieux repartie |__| - moins bien repartie |__|

III – DONNEES

III 1 – sur les cultures

Cultures	Superficies (Ha)	Par rapport a l'annee precedente
Riz	|__|__|__|__|__|	Plus meme moins
Mais	|__|__|__|__|__|	Plus meme moins
Manioc	|__|__|__|__|__|	Plus meme moins
Patate Douce	|__|__|__|__|__|	Plus meme moins
Paturage	|__|__|__|__|__|	Plus meme moins
Autres	|__|__|__|__| |__|__|__|__| |__|__|__|__|	Plus meme moins Plus meme moins Plus meme moins

III 2 – Sur l'elevage

Animaux	Quantite l annee passee	Quantite cette Annee
Boeufs		

IV – APPRECIATION DE LA CAMPAGNE

IV-1 - Comment voyez-vous la **campagne en cours** ?

par rapport a la campagne precedente	par rapport a une bonnee annee	par rapport a une mauvaise annee
Mieux |__|	Mieux |__|	Mieux |__|
Aussi bon |__|	Aussi bon |__|	Aussi bon |__|
Pire |__|	Pire |__|	Pire |__|
Beaucoup pire |__|	Beaucoup pire |__|	Beaucoup pire |__|
Precision		

V – DEGATS SUR LES CULTURES

Cultures	Causes	Degats estimes (%)
Riz		
Mais		
Manioc		
Patate Douce		
Paturage		
Autres		

VI – SI LE PAYSAN MENTIONNE –LUI MEME– les criquets, posez lui le suivant
Decrivez les criquets que vous avez vu (larves, essaims, etc)?

_____

_____

Comparer ca avec des criquets vu avant (si jamais)

_____

_____

VII – BILAN PAR PRODUIT POUR L'ANNEE EN COURS (OU CE QUI VIENT DE FINIR)

Cultures	Estimation Recoltes possibles (T)	Prix au marche	Prix par rappor a l annee precedente
Riz	_____	_____	Plus meme moins
Mais	_____	_____	Plus meme moins
Manioc	_____	_____	Plus meme moins
Patate Douce	_____	_____	Plus meme moins
Autres	_____ _____	_____ _____	Plus meme moins Plus meme moins

VII-2- **D'habitude,** pour combien de mois suffisent les recoltes ? __ __ **mois**

VII-3- Estimez vous que la recolte de **cette annee** est suffisante pour couvrir vos besoins

Si NON preciser le **nombre de mois** |__|__| mois

VII-4- Comment comptez-vous **combler le deficit** ?

VIII - Est-ce que vous ACHETEZ des cereales avant les recoltes ? OUI |__| NON |__|

Si, OUI, combien les payez-vous ?

Comparer ces prix a la normale PLUS CHER |__| MOINS CHER |__|

IX - Est-ce que vous VENDEZ des cereales apres les recoltes ? OUI |__| NON |__|

Si, OUI, combien les payez-vous ?

Comparer ces prix a la normale PLUS CHER |__| MOINS CHER |__|

X – Passez 15 minutes a noter tous vos impressions ici

Outil 3 · GUIDE D'EVALUATION

DES PRIX SUR LES MARCHES ET LES COMMERCANTS

I - IDENTIFICATION

Nom du marche ou du commerçant
Commune/Village

II – Disponibilite des produits

Quels sont les produits disponibles sur le marche actuellement ?

Produits	OUI/NON
Riz	
Mais	
Manioc	
Patate Douce	
Autres	

III– Prix des differents produits (preciser l'unite) en comparaison aux prix du meme mois de l'anee passee

Produits	Prix au marche Normal	Prix au marche actuellement	Prix au marche L an dernier
Riz	_____	_____	_____
Mais	_____	_____	_____
Manioc	_____	_____	_____
Patate Douce	_____	_____	_____
Autres	_____ _____	_____ _____	_____ _____

IV Si on rencontre un collecteur demandez
A STOCKS DE CEREALES OUI / NON
B PRIX (FMG/UNITE A L ACHAT) ——————
C DISPONIBILITE CHEZ LES PAYSANS OUI / NON

IV Passez 15 minutes a noter tous vos impressions ici

Lessons Learned from the Rapid Crop Assessment Survey

The purpose of this section is to review the current survey mission and make some suggestions for similar missions in the future

1 Scope and objectives of the mission
   - **a** A large scale quantitative assessment is not possible in a limited amount of time, especially where baseline data on area under cultivation and historical production and area data are not available
   - **b** The narrower the focus of the mission the better will be the sampling of the target population In this case, narrowing the sample to just locust infested villages would have given better locust damage information for use in projections Likewise, not spending hours at a time seeking out locust infested villages would have allowed for a larger random sample for the determination of general harvest results

2 Team composition and survey preparation
   - **a** Assessment teams tasked with surveying crop fields to determine damage or loss should have one member with a good understanding of crop growth and development, or members should be specifically trained to measure area and yield loss
   - **b** Detailed discussions of guideline design by our participants helped standardized survey results
   - **c** Limiting the survey to a short (3 or 4 items) list of simple comparisons will allow for more interview time spent probing for answers on each item This will insure a more complete and reliable data set for analysis

3 Interviewing and field survey technique
   - **a** Many farmers need assistance in measuring their crop production and losses Detailed discussions, preferably in or beside the farmers' fields, allows for the use of actual measurements and props that can help prompt accurate estimates by the farmers
   - **b** An effort must be made not to lose precious time looking for officials and technicians even though there input is important Sending messages in advance may help

4 Analysis
   - **a** Sampling size and methods in a rapid survey will not likely allow for statistical analysis of data Therefore, great care should be taken in making inferences within and especially beyond the area and time period sampled

Vavatenina (315) PAS DE CRIQUETS	2 48	0 63	X	AI-CN
Marovoay (406 SR04)	13	2 06	M=3 mars – 3 mai / R=2 mai – 2 aout	AI-NO
Bonzany (409 SR04)	1 5	2 04	M=3 mars – 3 mai / R=2 mai – 2 aout	AI-NO
Befandriana Avara (412 SR06)	52	2 27	M=3 mars / R=2 avril – 3 juin	AI-NO
Tshiombe (514) SAP	3 13	0	X	AD/ATM (+, +)
Bekily (518) SAP	2 01	0 64	X	ATM (+,+)
TOTAL	**55%**	**35%**		

PROPOSITION

5-7 EQUIPES

1 District 406 409, 412
2 Districts 111,112,113
3 Districts 312 313 314
4 Districts 101, 109, 118 202
5 Districts 110 114 [illegible] ICR, 119

CROP ASSESSMENT MISSION RESULTS

DISTRICT	NO FARMERS	NO RANDOM	RAINFALL QUANTITY (VS NORM)			RAINFALL DISTRIBUTION		OVERALL HARVEST VS 1996/97			RICE DAMAGE DUE TO		
			LESS	SAME	MORE	WORSE	BETTER	WORSE	SAME	BETTER	LOCUST	FLOODS	OTHER
SOAVINANDRIANA	4	1	4	0	0	4	0	1	3	0	3	0	0
TSIROANOMANDIDY	3	2	1	1	1	2	1	0	1	2	3	0	0
MIARINARIVO	4	0	0	3	1	0	4	1	0	3	3	0	0
	11	3											
AMBOSITRA	8	8	1	1	3	4	4	1	3	5	6	0	2
AMBATOFINANDRIANA	10	10	2	1	7	2	8	7	3	0	7	0	2
FANDRIANA	2	2	0	0	2	1	1	0	2	0	0	0	0
	20	20											
AMBATOLAMPY	6	6	1	0	5	5	1	6	0	0	0	5	1
ANTSIRABE II	5	5	0	0	5	3	2	3	0	2	0	5	0
ANTANIFOTSY	6	6	0	1	5	4	2	4	1	1	0	2	0
BETAFO	6	6	0	0	6	4	2	2	1	3	0	3	0
	23	23											
AMPARAFARVOLA	4	4	0	4	0	4	0	2	1	1	0	1	2
AMBATONDRAZAKA	6	6	6	0	0	6	0	2	1	3	0	3	0
MORAMANGA	7	7	2	0	5	7	0	4	1	2	0	2	3
	17	17											
TANA 117	8	8		4	4		2		8		0	1	6
TANA 102	1	1		1							0	0	1
	9	9											
15	80	72	17	16	44	46	27	33	25	22	22	22	17
		% farmers	21%	20%	55%	58%	34%	41%	31%	28%	28%	28%	21%
		% districts	13%	27%	60%	69%	31%	40%	13%	33%	33%	33%	33%

Table 2a

CROP ASSESSMENT MISSION RESULTS

	RICE PRICE 98 vs 97			MAIZE DAMAGE DUE TO			MAIZE PRICE 98 vs 97			HARVEST SUFFICIENT?		COMMENTS
DISTRICT	LESS	SAME	MORE	LOCUST	FLOODS	OTHER	LESS	SAME	MORE	YES/SAME	NO/WORSE	
SOAVINANDRIANA	3	1	0	3	0	0	3	1	0	0	3	
TSIROANOMANDIDY	1	2	0	3	0	0	2	1	0	3	0	
MIARINARIVO	3	1	0	3	0	0	3	1	0	2	2	
AMBOSITRA	4	0	4	3	0	0	1	0	1	3	5	
AMBATOFINANDRIANA	9	0	1	5	0	0	5	3	1	2	8	
FANDRIANA	1	1	0	0	0	0	NA	NA	NA	2	0	
AMBATOLAMPY	4	2	0	0	3	0	2	2	2	1	5	
ANTSIRABE II	4	0	0	0	3	2	3	2	0	5	0	
ANTANIFOTSY	2	1	0	0	3	0	2	0	2	5	1	
BETAFO	1	0	4	2	0	0	0	0	2	4	2	
AMPARAFARVOLA	0	0	5	NA	NA	NA	NA	NA	NA	4	0	Rice more expensive maize less expensive than last year
AMBATONDRAZAKA	0	0	6	NA	NA	NA	NA	NA	NA	6	0	Rice more expensive maize less expensive than last year
MORAMANGA	0	3	4	0	0	1	0	0	1	3	4	
TANA 117												
TANA 102												
15	32	11	24	19	9	3	21	10	9	40	30	
fo ferme	40%	14%	30%	24%	11%	4%	26%	13%	11%	50%	38%	
fo dr.sl	46%	23%	31%	55%	27%	9%	50%	30%	20%	58%	42%	

A Method for Estimating Maize and Rice Crop Loss When Field Data is Limited

1 **Based on a 4 day survey in 3 districts of the Moyen-Ouest in May, 1998**
2 **Based on most complete district-level national agricultural production data available**
3 **Wide application of the method requires knowledge of the specific areas and timing of infestation—the more precise (village/commune and crop growth stage) the better**
4 **Requires assumptions about**
- **percent of total crop area in the field at time of infestation**
- **percent of production loss in any one crop field or village**
- **percent of villages infested in a district**

5 **Assumptions can be easily manipulated to project different scenarios**

Application of the Method—an example

1 Crop loss in the District of Soavinandriana
- Based on crop calendars and discussions in the village **100% of the annual maize crop** was in the field at the time of infestation and **50% of the annual rice crop** was in the field
- Based on observations made in maize and rice fields in the village, **maize loss was estimated at 20% and rice loss at 15%** (estimation based on number of plants/field destroyed or damaged, % of total crop area infested, and area replanted)
- **See attached Map** Based on local DPV data and discussions with villagers and the local DPV technician, **11% of the villages in the District were infested**

2 Extrapolation to the national level (see attached spread sheets)
- Using the assumption that crop loss for all other Districts is the same as that for Soavinandriana national level loss numbers are calculated
- This **assumption is, obviously, not correct** for extrapolation to the national level and needs to be improved with the lowest administrative unit level locust infestation information that is available
- **All other assumptions need to be improved** with location specific data

POTENTIAL LOSS	THIS EXAMPLE	UNIT
In one Village	Rice 15% , Maize 20%	*Of Village Annual Production*
In one District	Rice 10% , Maize 10%	*Of Villages*
Per Agricultural Calendar unique to each district	1st Quarter 50% Half in Middle 100% Last Quarter 50%	*Of crops exposed to loss*
Total	Rice 0 75%, 1 5%, 0 75% Mais 1%, 2%, 1%	*Of annual production (per portion of season)*

EXAMPLE de PERTES POTENTIELLES

RIZ

ZONE	AOUT	SEPT	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILL
AD Total	0	0	0	0	0	145	241	290	290	145	48	0
AI-CN Total	0	143	1 355	2 699	4,270	6 177	7 147	7 147	5 299	3 897	1 374	0
AI-MO Total	0	873	1 611	3 413	4 859	5 405	5 405	4 826	3 055	2 124	162	0
AI-NO Total	0	0	0	0	977	2 028	3 712	4 057	4 057	2 360	1 654	0
AI-O Total	0	0	173	259	604	776	1 035	776	690	345	172	0
AMI-N Total	0	840	1 308	2,170	2 762	2 811	2 811	1 951	1 346	545	224	0
AMI-O Total	0	0	302	453	858	937	957	660	461	176	59	0
AMI-S Total	0	117	311	585	800	936	936	878	642	410	114	13
ATM Total	0	46	112	157	225	274	277	279	256	140	136	7
National Total	**110**	**3,602**	**8,971**	**16,171**	**25,132**	**30,922**	**34,699**	**33,030**	**25,383**	**16,810**	**8,015**	**256**
% Prod Nat'l	**0 0%**	**0 2%**	**0 4%**	**0 7%**	**1 1%**	**1 3%**	**1 5%**	**1 4%**	**1 1%**	**0 7%**	**0 3%**	**0 0%**

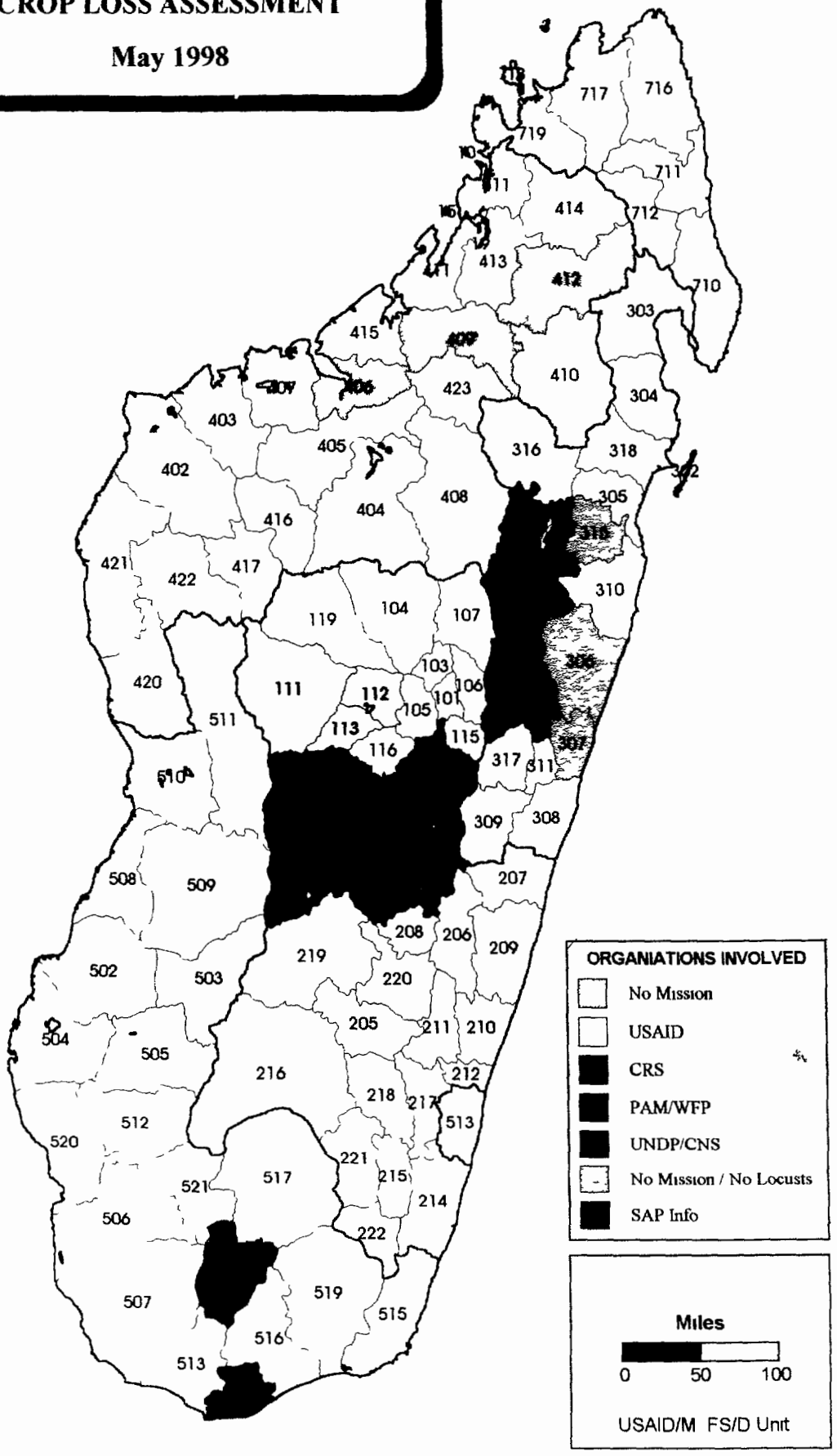
MAIS

ZONE	AOUT	SEPT	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILL
AD Total	0	0	0	63	158	189	126	32	0	0	0	0
AI-CN Total	3	4	15	26	38	62	213	347	431	423	265	75
AI-MO Total	128	192	405	832	1 036	1 280	1 253	1 006	558	430	0	0
AI-NO Total	0	0	0	0	36	104	51	13	1	0	0	0
AI-O Total	0	0	0	0	6	16	19	16	6	0	0	0
AMI-N Total	0	0	11	46	91	106	94	61	16	5	0	0
AMI-O Total	0	0	0	2	20	75	113	92	37	0	0	0
AMI-S Total	0	0	1	43	84	90	66	26	7	3	0	0
ATM Total	0	0	0	39	90	102	68	17	0	0	0	0
National Total	**204**	**306**	**612**	**1,413**	**2,148**	**2,896**	**2,994**	**2,274**	**1,518**	**1,062**	**325**	**89**
% Prod Nat'l	**0 11%**	**0%**	**0%**	**1%**	**1%**	**2%**	**2%**	**1%**	**1%**	**1%**	**0%**	**0 05%**

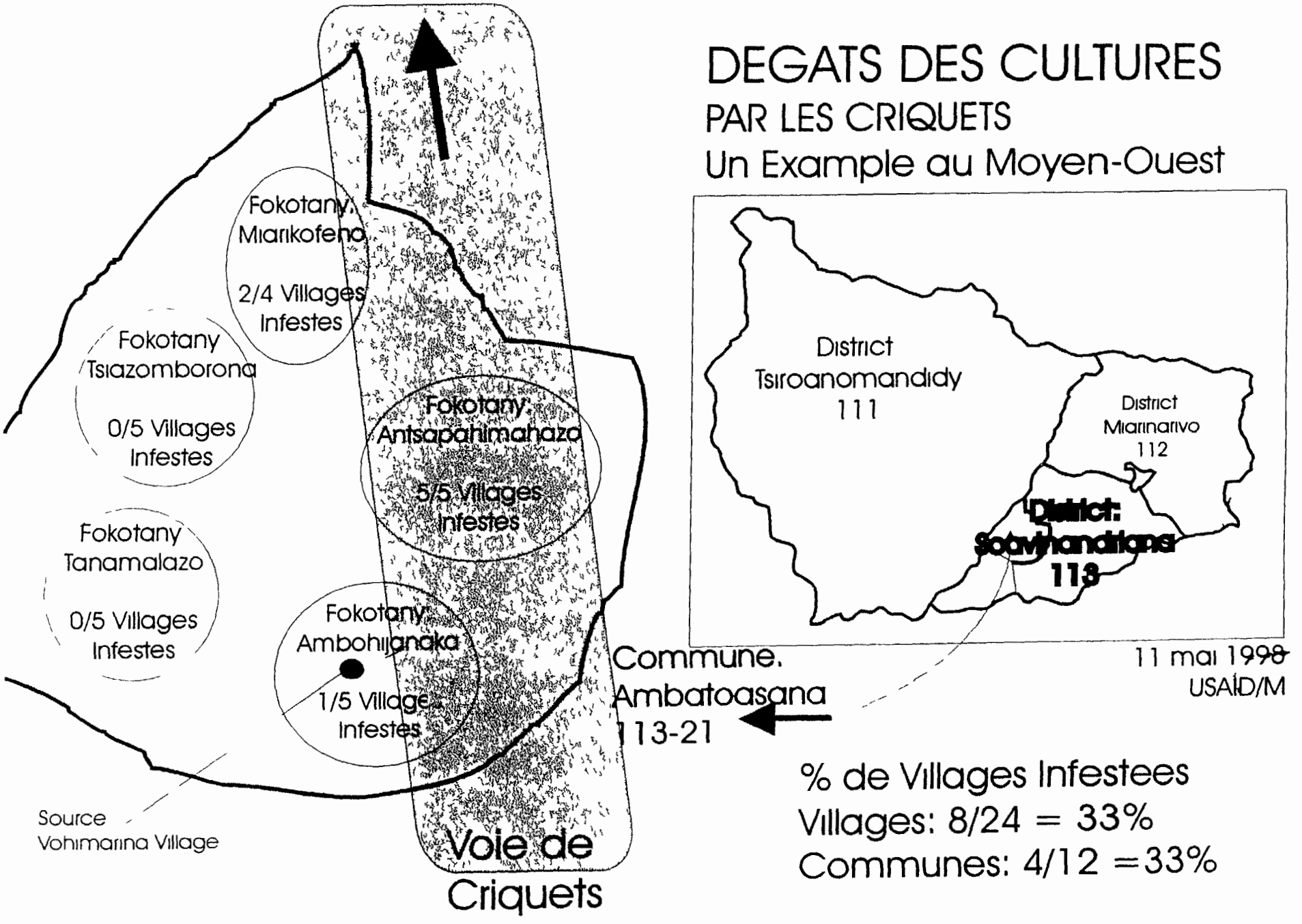
Joint Donor

CROP LOSS ASSESSMENT

May 1998



DEGATS DES CULTURES
PAR LES CRIQUETS
Un Example au Moyen-Ouest



Appendix E Survey Questionnaires for Farmers

Outline of farmer field survey questions for Surveys I

1 Principal Crops Grown

2 Crop Loss, Alternative Crops and Ways to get food

3 Locusts, When
Where
Stage
Moving Where
Ovipositing

4 Spraying, When
Where
How
Consequences
planes vs helicopters vs ground control

5 Powder Pesticide use, availability, efficacy

6 Eat locusts, use for animal food

7 Safety of pesticide application, equipment, washing

8 Safety after spraying
cattle grazing
water contamination
warnings on eating locusts

9 Barrels, disposal, reuse for water and food storage

10 Local alternative locust controls

Survey II used these additional questions

11 Any foreigners ask questions about locusts
12 ALS ask questions about locusts
13 Other animals killed by spray,
    Birds
    Lizards
    Frogs
    Snakes
    Fish
    Other Insects
    Mammals

Appendix F List of Locations Where Surveys Were Completed

Survey I
Near Malazaimanga
Near Ankuzomiristra
Roadside 10 km east of Anjomar Ramartina
Miandrivazo
Ambatomena
Ambalamboro
Betalatala
Ankiranomena
Dabolav
Ankazomanga
Antanambao Ambary
Kombiza Tsitesaraka
Hordranomanelatra
Sambaina
Tsaramody
Ambatomainty Fihaonana
Ilempona
Ambatolampy

Survey II
Ambohimahasoa
Ankaramena
Voatavo
Ihosy
Tulear
Sakaraha
Andranomaitso
Herders 35 kilometers south of Ihosy on Horombe Plateau
Andrera
Tritriva Vohibato

Confounding factors

1 There are very few villages near Ihosy (Survey II), on the Horombe plateau, and on the road to Tulear, so sample size on the second survey was inclusive, but limited, due to lack of villages

2 The survey in Ihosy was further complicated by the fact that the President and his entourage were lodging at, and his two locust control helicopters were operating out of, Ihosy These factors necessitated the need for our survey team to be temporarily relocated to Tulear, until an official mission order could be produced

Appendix G List of USAID Approved Pesticides

The following is an alphabetical listing of the pesticides approved in the PEA The list includes relevant information on toxicity, bio-accumulation and signal words that indicate the relative toxicity of each insecticide This information provides a sketch of properties of the A I D -approved anti-locust/grasshopper pesticides All of the chemicals listed below are currently registered either by the U S Environmental Protection Agency (EPA) or its equivalent in other countries for locust and grasshopper control

	TOXICITY TO NON-TARGET ORGANISMS						
	Fish	Inver	Birds	Mam	Bio A	Pers	Sign
1 ACEPHATE	L	L	L	M	L	L	C
2 BENDIOCARB	M	M	M	M	M	M	W
3 CARBARYL	L	L	L	L	L M	L	C
4 CHLORPYRIFOS	M	M	M	M	M	L C	W
5 DIAZINON	M	H	M H	L	M	M	C W
6 FENITROTHION	L	H	H	L	M	L	W
7 LAMBDA CYHALOTHRIN	H	H	L	H	H	M	D
8 MALATHION	L	L	M	L M	L	L	C

LEGEND

Toxicity to Non target organisms
Fish
Invertebrates Including Honybees
Birds
Mammals
BIO A = Bio accumulation
PERS = Persistence
SIGN = SIGNAL WORD

L = LOW, M = MODERATE, H HIGH (Apply to toxicity levels to non target organisms, bio-accumulation and persistence, relative toxicity is also
a function of formulation and active ingredient concentration)

Legend for Signal Words C = CAUTION, W = WARNING, D = DANGER (POISON), (Applies to the relative toxicity of pesticides in ascending order, relative toxicity is also a function of formulation and active ingredient concentration)
Specific dosages must be worked out by highly experienced personnel familiar with the application equipment, pesticide formulation, etc , to be used